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RALEIGH

Died 29 October 1618

IT is now three hundred years since the death of Sir Walter Raleigh—the first though not the last Englishman who by great deeds oversea made his country's fame and his own undoing. Born, most probably, in 1552, in the middle of the century when English explorers and sea captains were seeking new outlets for English trade and expansion, he lived to direct their energy to the fields where it was destined to bear its chief fruits—to see the English colonization of North America successfully begun. Like Captain John Smith, who brought to life the seeds of colonial enterprise Raleigh planted in Virginia, he began his career in the continental wars. As a boy of fifteen he volunteered for service with the Huguenots, and perhaps from Coligny he learned that idea of oversea expansion—an England beyond the seas—which was the master idea of his ambitious and crowded life. To us, looking back now on the part he played in the critical years through which he lived, he seems the most versatile figure of that versatile age. He had a share in all that was great and moving in its life—its politics, its wars, its literature. From service abroad, not only in France but also in the Netherlands (1577), he returned to England to take part in Sir Humphrey Gilbert's first expedition of discovery (1578), and shortly after the failure of that attempt, he received, like other Tudor nobles, a commission in Ireland, then as ever struggling against England's vain efforts to conquer and govern her. The Irish service he disliked, though it brought him profit, for he received a little later large grants of land in Cork, Waterford, and Tipperary. His personal gifts attracted the Queen's notice, and he became and he remained throughout her reign one of the principal figures at Court, immersed in the intrigues and factions of the day, alternately favoured and disgraced. In the war with Spain he played no mean part, assisting to organize the land forces at the time of the Armada and distinguishing himself in the expeditions to Cadiz (1596) and to Fayal (1597). He sat for some years in Parliament, and some of his speeches still live. Royal favour brought him important administrative posts. He was Lieutenant-General of Cornwall, Lord Warden of the Stannaries, where his jurisdiction "marked an era of reform," and Governor of Jersey, a post he filled with credit. Such, and we omit for the moment the part he played in the voyages and

SIR WALTER RALEIGH AND HIS SON WALTER

From the painting by MARCUS GHEERAERTS, dated 1602, in the possession of SIR HENRY FARNABY LENNARD Bart. of Wickham Court, by whose kind permission it is reproduced

discoveries of Elizabeth's reign, was the active side of his life. The intellectual side was not less varied and distinguished. The inscription under his portrait in the first edition of his greatest work describes him as "the honourable and learned knight," and if we except Bacon, none of his contemporaries had a wider range of knowledge or wrote on so many subjects with equal force and originality. Whether it was philosophy, history or geography, the art of war, international politics, seamanship, or trade, Raleigh had read widely upon it, thought with penetration, and in many directions could break new ground. He was well acquainted with works on geographical discovery, and advised and assisted Hakluyt; he claimed to have written the first treatise on the art of sea warfare; his scientific interest brought him no small medical fame; he was a member of the Society of Antiquaries, and his free discussion of religion cast doubt on his orthodoxy. The friend of Marlowe and Spenser, he had the true poet's gift. His political writings are remarkable for their ripe wisdom and experience, and the gigantic fragment of his History of the World—the monument of his long imprisonment—ranks him with the greatest English historians. He was a man cast in a large mould, daring in action, comprehensive in outlook, who seized the many chances which time and fortune brought him. Yet with all this versatility, his enduring influence rests on something else, slenderer in achievement, greater in idea—his attempts at colonization, the Virginia which he never saw, but which he believed would become "an English nation." He travelled less and explored less than many of his contemporaries; he failed in the colonial undertakings on which he lavished labour and fortune, yet to them he owes his lasting fame, as the greatest of the Englishmen who in the reign of Elizabeth conceived the idea of an England beyond the seas.

In this respect Raleigh may be accounted happy in the opportunities of his life. In the last quarter of the sixteenth century the time was ripe for some concentration of English attempts at oversea expansion. It was time to choose some definite sphere of action and to mark it out by real occupation. Since the years when John Cabot's great voyages had unloosed the energies of Englishmen and pointed them oversea, English explorers, going east and west, had traced out the coasts of the continents and outlying islands of Northern Asia and America. Fired by the greatness and ease of Spanish and Portuguese discoveries, and drawn by the magnet of the Eastern trade, they had struck out on every side, now venturing into the Arctic regions, now making their way overland to Central Asia and Persia, now in the Mediterranean and the Baltic, now rounding Cape Horn, testing the power of Spain, exploring, forcing a trade, smuggling, plundering, and privateering. In half a century of ceaseless activity they had made the acquaintance of most parts of the world. Sea-power was seen to serve every cause England had at heart—the security of the island kingdom, the weakening of Spain, the victory of Protestantism, discovery, and trade. Her captains were not pacific and cautious, they were

distinctly and fiercely aggressive, breaking international arbitrations and laws which shut them out from a share in the newly discovered worlds and striking hard at Spain's sea-power, the sinews of her tyranny in Europe.

Inspiring all this activity were two great desires—the pursuit of wealth and of national greatness. Wealth must be obtained by the increase of trade, by the discovery of countries with rich products, by a new and better route to the great source of trade—Cathay and India, to the infinite wealth of the East. The idea that oversea trade was an unfailing source of wealth had laid hold of the country. While the value of discoveries of the precious metals was fully recognized and figured largely in appeals to the popular imagination, Englishmen seem generally to have realized that commodities other than gold or silver were the surest source of wealth, and trade the best means of increasing it. In the strength and clearness of this idea the English conception of oversea expansion emerges.

Then there was national greatness. Contemporary writers do not seem to have felt anxious about English independence. Later generations saw more clearly the perils that menaced it. The Elizabethans were confident of themselves:

> "This England never did, nor never shall,
> Lie at the proud foot of a conqueror. . . ."

To be as great as Spain and Portugal, to vie with their feats: that was the motive—envy and emulation of the Latin nations to whom fortune had given the first entry into the rich new worlds and who barred the way with their monopoly. From their example came the desire to add new dominions to the English Crown.

The cautious spirit of the Tudor sovereigns lagged behind the wild enterprise and courage of their subjects. Diplomacy wore a veil of respectability, and expeditions, whether for discovery or piracy, or both, or either, as circumstances fell out, had to be organized and equipped as private ventures. Hence their originators appealed to the cupidity as well as the patriotism of their supporters with lavish promises of gold and gain. But they had the ear of the public, for a spirit of adventure was abroad. Men of substance risked their capital, sea-captains, pushing their way over uncharted waters, found "no land uninhabitable and no sea unnavigable," and Hakluyt, whose labours fanned the flame of patriotism, writes of "this age wherein God hath raised so general a desire in the youth of this realm to discover all parts of the face of the earth." But not even those who, like Raleigh, thought that open and offensive war should be waged against Spain designed the conquest of her empire. The desire was to discover—to discover lands not held by any Christian prince. The world seemed infinitely large to the Elizabethans, and though they might plunder, they neither hoped nor wished to wrest from Spain her vast dependencies, only to open a way whereby they might follow her example and build an empire for themselves.

Thus, out of this turmoil of ideas and activity of such diverse kinds in all parts of the world, emerged in time a definite idea of planting colonies in America, where might grow up an English nation, enjoying all the privileges of free denizens of England, making laws as nearly as possible conformable to those of England, and united in perfect league and amity with her. Something of a sense of destiny in regard to America entered into the mind of England. It was providentially and fatally reserved for England, and the English had rights there which they must assert, by force of arms, if need were, and realize by planting a Christian habitation and regiment there. It is significant that the English idea of expansion thus early took the form of free countries beyond the seas. The patents granted to Gilbert in 1578 and to Raleigh in 1584 spoke in such language, and in 1582 a settlement of English Catholics in America, where they could enjoy religious liberty, was proposed—an idea destined to be realized later in the colonization of Maryland. Thus the British Empire was to be born in freedom. There was no narrowness in the outlook of those who designed the grand lines of its foundation. To no one mind can their large conception be attributed. It was the product of all that made the life of England free as it was. Englishmen naturally envisaged a new England formed in the likeness of the old—an image not obscured even when the enthusiasm of their first hopes was sobered in the hard experiences of actual colonization that followed, and only partially and temporarily dimmed by the commercial spirit of a later time.

Raleigh grew up in an atmosphere quickened by the ideas and ambitions we have described. He numbered amongst his friends and relations some of the most notable seamen of his time, of whom Sir Richard Grenville, the hero of the *Revenge*, was his cousin, and Sir Humphrey Gilbert his half-brother. Discarding the piracy which satisfied so many of his contemporaries, he gave the weight of his intelligence, the bulk of his fortune, and much of his labour to the idea of colonization. To him more than to any one else it was due that England found a definite field of expansion and that the manifold activity of Elizabeth's reign brought forth the great work of American colonization which began in her successor's. It was Gilbert who made "the first practical suggestion for an English colonial empire." But Gilbert, though he received a patent of colonization and took possession of Newfoundland, was nearer in spirit to explorers like the Cabots, Willoughby, and Frobisher than to Raleigh, whose work broke new ground. Raleigh himself contributed to enterprises which aimed at the discovery of the north-west passage, but the fact that he joined Gilbert's first abortive expedition, invested largely in the second, and the year after his half-brother's death obtained a patent of colonization for himself, showed that he had turned his eyes in a new direction. In 1584 he organized the first of the long series of oversea ventures for which he was responsible and in which English colonization begins. Captains Amadas and Barlow, whom he despatched on this preliminary

expedition, took the southern route to America by way of the West Indies, and following the coast of Florida northwards they reached the islands Wokoken and Roanoke and took possession of them and the adjacent mainland. To the territory thus annexed the Queen gave the name of Virginia. The way being thus opened and a land suitable for settlement discovered, Raleigh prepared at once for the greater task of planting it. In 1585 he sent out a second expedition under the command of Sir Richard Grenville with a body of colonists attracted by generous promises of land. Explorations were made as far north as Cape Hatteras, and the first English colony in America was founded. But the initial difficulties of colonization in any country are very great, and England had yet to buy at a high price the experience on which her later success depended. The new settlers failed to discover the gold for which they hoped, they fell out among themselves, stores failed, and in less than a year the settlement was abandoned, Raleigh's relief expedition arriving just too late to save it. Another attempt in 1587 failed in the same way. Continuous communication with England could not be maintained, nor adequate relief sent, at a time when Philip's Armada was threatening, and all ships were required for home defence. The little beginnings of English colonial enterprise were stifled in the pressure of the great struggle with Spain. English sea-power was not yet sufficient for the task, for, as Bacon afterwards wrote, "the wealth of both Indies seems, in great part, but an accessory to the command of the seas." Success came when peace and victory had given England a secure path across the Atlantic.

Raleigh had by this time expended the enormous sum of £40,000, and his efforts had ended in apparently total failure. In 1589 he transferred his patent to a company, which made an abortive attempt to establish communications with the unfortunate colonists, and then left them to their fate, though Raleigh himself sent at least five more expeditions at his own cost to their relief. But they were never found, for, as was subsequently ascertained, they had been massacred by the Indians; nor was it until 1608 that the roots of the Virginian colony were firmly planted. By that time Raleigh had been some years in prison, and the credit of the actual success belonged to others.

Though Raleigh never visited Virginia himself—his one attempt during his voyage to Guiana in 1595 being frustrated by contrary weather —the untiring and costly efforts he had made on its behalf, and not less the hopes he cherished for it, were the signs of a new development in English oversea expansion. They mark the transition from the search for the northward passage with the idea of the Eastern trade to colonization and conquest in America with the object of the expansion of England. This was the step forward which Raleigh made. Men like the Cabots had ideas as explorers, but they had not Raleigh's political vision, nor his ambition of State-building. Both were moved with the desire to find the East Indies. The elder Cabot looked west, his son Sebastian east. They

had before them the examples of Columbus and the great Portuguese explorers. But Raleigh had studied the Spanish Indies, and thought more of the power and wealth which the possession of conquered kingdoms had brought to Spain; thus he laid emphasis on expansion by colonization and conquest, which would bring new and rich realms under the English Crown; and marking out a definite sphere, he gave a new and far more fruitful trend to the aspirations of his time.

Meanwhile Raleigh's mind was turning over a new and vaster scheme, in which conquest was to play a larger part than colonization. In his reading of Spanish travels and his many talks with soldiers and sailors he had picked up a story of a city of fabulous wealth in South America, called Eldorado by the Spaniards and Manoa by the natives. This city was situated somewhere in Guiana, which country was still a fair prey to all comers, for Spanish adventurers had hitherto failed to effect its conquest. Mysterious and unknown, legend had woven round it wonderful stories of untold wealth. Raleigh resolved to investigate the story and to mark out this golden land for annexation by England. His first care was to collect all the information possible. He studied the means taken by the Spaniards to penetrate the country and the causes of their failure, and in 1594 he sent out a preliminary expedition, which returned with vague but hopeful stories. The following year he sailed himself. He reached Trinidad in March, surprised the city of San Josef, and took prisoner Berreo, the Spanish Governor of the island, from whom he derived some fresh information. Then, leaving his ships at Los Gallos, he started on his search with a force of one hundred men in a few small boats. Entering the Manamo mouth of the Orinoco, they made their way into the Orinoco itself near the modern San Rafael, and then turned into the Caroni. By that time the provisions brought were failing, and progress against the "terrible current" of the stream became slow and toilsome. Realizing that the attempt would have to be abandoned, Raleigh left two of his crew with a tribe of friendly Indians, and bringing away with him the son of a chief and some specimens of quartz, he returned rapidly down the river. The daring enterprise had failed. The distance was too great, the conditions too difficult, and Raleigh's preparations inadequate. But Raleigh was not disillusioned; he believed he had discovered fresh proofs of the wealth he sought, and returned to England determined to renew the attempt at the first opportunity. But the opportunity was to be long in coming.

On his arrival home with so little tangible evidence of the wealth of Guiana, Raleigh was coldly received. His gold-bearing quartz was said by his enemies to have been brought from Africa, and doubt was cast on the whole story of the voyage. To refute these calumnies Raleigh wrote his 'Discovery of Guiana,' one of the most interesting of English works of travel. Eloquent and informing, and substantially accurate, as subsequent exploration has shown, in its topographical information, it was a masterly

vindication of himself and unfolded his new ambitions of colonial expansion for England. Guiana was to be conquered by England and to become the English Peru. For this he argued in a further writing 'On the Voyage to Guiana,' proposing an alliance with the Inca against Spain, the arming of the Indians, and the transference of the war against Spain from Europe to America. But he failed to carry conviction. The Government had no faith in and no funds for such bold enterprises. Confident of ultimate success Raleigh was anxious to return, but military duties detained him at home. It is one of the strange facts of his career that with all his enthusiasm for travel he himself made but two important voyages. His many activities and interests, the Queen's opposition and doubtless too his uncertain position at Court made absence difficult. To keep up communication with the Indians, however, he sent out Captain Kemys in 1596, who returned with the bad news that the Spaniards had established a strong post at San Tomás, near the mouth of the Caroni, one of the main entrances to Guiana. Another vessel which he despatched at the end of the same year returned without accomplishing anything. But his unflagging efforts had drawn attention to Guiana as a sphere for English enterprise, and in the early seventeenth century new attempts were made by other adventurers. Raleigh's own activities were for the moment ended. The death of the Queen was the signal for his downfall. He was a man who had made many enemies, for his faults were large and glaring in proportion to his powers. Doubtless jealousy pursued one grown great and rich by royal favour, but men do not excite without much provocation such implacable animosities as Raleigh faced. He had in full measure the faults of his temperament and of his age, as he had also the unmistakable stamp of its greatness. On the accession of James, who had been informed that Raleigh was opposed to his claims, he fell from favour. He was deprived of his offices, committed to the Tower, and in November 1603 tried before a special Commission at Winchester on a charge of treason. Sentence of death was passed upon him, but he was shortly after reprieved and imprisoned in the Tower, where the next eleven years of his life were passed.

The journey to Guiana had left a deep impression on Raleigh's mind, and imprisonment did not quench his faith in his idea. He longed for a further opportunity to put it to the test, and for liberty to play a part again in the affairs of the world. Occupied as he was with the great work of history he had planned, he had lost none of his interest in seamanship and politics. But it was years before his proposal to undertake another expedition to Guiana received any encouragement. The opportunity came at last with changes at Court—the fall of Carr, the increasing influence of the Duke of Buckingham and the financial embarrassments of James, to whom Raleigh's promise to discover a gold-mine offered a tempting relief. In 1616 Raleigh was released to try his fortune, and began at once the preparations for his last and best-known voyage. Again he adventured all he had, and though a few gentlemen volunteers joined him, neither the

magic of Eldorado nor his own fame had their old attractive power. The majority of the merchants and the seamen of the west country were shy of the enterprise, and Raleigh's ships were eventually manned, as he said, with "the very scum of the world." Some had never seen the sea, others their "friends thought it an exceeding good gain to be discharged of, with the hazard of some thirty, forty, or fifty pounds, knowing they would not have lived a whole year so cheap at home." * Moreover, the Spanish ambassador protested vehemently against the expedition, which he contended was bound to violate the King of Spain's dominions. Raleigh found that he was starting with his life in his hands, and would have been willing to divert his force to an attempt on Genoa in aid of Savoy, but the King would not agree. Committed to the enterprise he sailed from Plymouth in June 1617, intending, it appears, "to attempt to capture the Mexican Plate fleet, to establish himself in force at the mine, and to seize the islands of Trinidad and Margarita as the keys of the position" ('Dict. Nat. Biog.'). He knew that he could not accomplish his design by peaceful exploration, but he trusted that success would ensure pardon, or in the worst event enable him to retreat to France. Misfortune dogged the expedition from the start, and when at last it reached Guiana Raleigh was too much enfeebled by illness to attempt the journey inland. So he remained at Trinidad, and Kemys commanded the force that went in search of the mine. Kemys found his path barred by the Spanish settlement at San Tomás, which he attacked and burned. In the attack Raleigh's son was killed and victory failed to open the way, for the Spaniards still held the woods. So Kemys returned with the bad tidings and killed himself in despair at Raleigh's reproaches. From that time Raleigh was unable any longer to control his men. They would neither renew the attempt on the mine nor watch for the Mexican fleet. The expedition broke up, and Raleigh, sailing by way of St. Kitts and Newfoundland, returned empty handed to England. The rash adventure had failed. Age and infirmity alone should have prevented Raleigh from attempting it. To search for a gold-mine with such a company and with death as the penalty of failure might seem a madman's gamble. But success was always near to Raleigh's sanguine vision. He had the imagination without which great things are not attempted, and that is not always patient of the sanest judgment. And perhaps liberty seemed worth while at any price. The price was paid. James, who had allowed and then betrayed the expedition, yielded to the reiterated demands of Spain, and Raleigh was executed on his old sentence on 29 October 1618.

Quite apart from the inevitable collision with the Spaniards in Guiana, it was not without reason that Spain desired the death of Raleigh. Throughout his long career Raleigh had been the fearless opponent of Spain's claims and power. He was never bound by the idea that nothing

* Works, vol. 8, 480. The references to Raleigh's works are to the Oxford edition, published in 1829.

could be done against Spain, "whose weakness we have discovered to the world" (Hakluyt, Everyman's Library, 5, p. 13). On the contrary he believed that her power could be broken. Neither would he for an instant admit her right to monopolize the Indies, where he believed there was room in abundance for England to work out as great a destiny and greater than Spain had achieved. To him Spain was at once a proof of the greatness that empire brings and a barrier in the way of England's expansion. And the two thoughts were ever in his mind—esteem of Spain for what she had done, and the determination to challenge her power and monopoly. They were the starting-point from which grew all his plans. At times he wrote very bitterly and violently against Spain, marking her down as the enemy: "It is the Spaniard that is to be feared," he says in his 'Discourse on Prince Henry's Marriage'; "the Spaniard who layeth his pretences and practices with a long hand" (Works, 8, p. 239). And in his account of the last fight of Sir Richard Grenville he attacked Spanish ambition with the utmost vehemence. "How irreligiously they cover their greedy and ambitious practices with that veil of piety; for sure I am that there is no kingdom or commonwealth in all Europe, but if reformed they invade it for religion's sake; and if it be, as they term, Catholic, then they pretend title: as if the kings of Castile were the natural heirs of the world" (Hakluyt, Everyman's Library, 5, p. 12). At a later date he did justice to the "invincible constancy" of the Spaniards, and the courage and perseverance with which they had pursued their discoveries, writing in one of the last sections of his 'History of the World,' "they are worthily rewarded with those Treasuries and Paradises which they enjoy; and well they deserve to hold them quietly if they hinder not the like virtue in others which (perhaps) will not be found" ('History of the World,' book v. ch. 1, sect. 10). The abilities of Spain, he argues in his preface to the 'Discovery of Guiana,' "rise not from the trades of sacks of Seville oranges, nor from ought else that either Spain, Portugal or any of his other provinces produce: it is his Indian gold that endangereth and disturbeth all the nations of Europe; it purchaseth intelligence, creepeth into councils, and setteth bound loyalty at liberty in the greatest monarchies of Europe. If the Spanish king can keep us from foreign enterprises and from the impeachment of his trade, either by offer of invasion, or by besieging us in Britain, Ireland, or elsewhere, he hath then brought the work of our peril in great forwardness" (Works, 8, p. 388). From this point of view he argues strongly for the acquisition of Guiana, challenging and denying Spain's title there. England's answer to Spain must be the establishment of an oversea empire for herself, of which the seat might be "the mighty rich and beautiful empire of Guiana," where would be found "a better Indies for her Majesty than the King of Spain hath any." If England occupies Guiana, "after the first or second year, I doubt not," he writes, "to see in London a contractacion house of more receipt for Guiana than there is now in Seville for the West Indies" (Works, 8,

p. 466). "Whatsoever prince shall possess it shall be the greatest, and if the King of Spain enjoy it, he will become unresistible." Already through the treasure of Peru, he had become in a few years "from a poor King of Castile, the greatest monarch of this part of the world," and not only the greatest monarch, but also "the greatest merchant." Thus Raleigh argued for offensive war against Spain, and for oversea expansion as the means by which England could gain the same sinews of strength that Spain had, for by a merely defensive war he believed England would lose her trade and perish; nor did he think that Spain was much weakened by enterprises of piracy and descents upon her American ports in which her strength did not lie.

By setting the struggle with Spain in the forefront of his plans Raleigh taught the Elizabethans to look at colonization with a political eye. In his proposals he showed not only private profit to be involved, but also the national future. Colonial expansion was part of the long fight for independence, the symbol and instrument of English emancipation from Spanish tyranny, freeing us from Spain's monopoly of the Indies and promising to place us on the same level of greatness with her. Such ideas showed the broader sweep of his mind when compared with his predecessors and contemporaries. But they were too direct and venturesome for Elizabeth, and running counter to the diplomatic schemes of James, they drove Raleigh at last on the rock where his life and plans made shipwreck.

The conquest of Guiana which Raleigh had proposed was an essentially different plan from the colonization of Virginia. It would have involved the beginnings of imperialism as distinguished from the free settlements projected in North America. And it is interesting to see that Raleigh envisaged to some extent the problem of imperialism. He takes the greatest pains to win the hearts of the Indian tribes, and with no small success. The love and service of nations, he contends, is not to be despised. It is the foundation of power. Suitable people, he points out, should be sent to deal with the natives: the country must not be left "to the spoil and sackage of common persons" (Works, 8, p. 430). "I suffered not any man," he writes, "to take from any of the natives so much as a pina, or a potato root, without giving them contentment, nor any man so much as to offer to touch any of their wives or daughters: which course so contrary to the Spaniards (who tyrannise over them in all things) drew them to admire her Majesty, whose commandment I told them it was, and also wonderfully to honour our nation." And he sacrificed, he says, opportunities of gain in order to ensure the loyalty of the people. In a fragment included in one of his essays he discusses the way to civilize savage peoples, insisting on the importance of gentle and just treatment and of a knowledge of the native language, and, following the example of the Portuguese and Jesuits in Brazil, he suggests that they should be drawn into cities. In the 'Voyage for Guiana' he recommends that the Indians should give "special hostages to be sent into England, which being civilled

and converted here, upon their return and receiving of others in their rooms they may be matched in marriage with English women." It is clear that Raleigh's idea of the government of primitive peoples was broad and tolerant and civilizing, and that he knew how to deal with them so as to win their confidence and affection. The behaviour of the natives of Calliana seems the one bright spot in the unhappy story of the second voyage to Guiana (Works, 7, p. 632). It is interesting to compare the traits of his character that come out in this relation with his alleged haughtiness and contempt of the populace at home and consequent unpopularity with them, and also the devotion of the natives to him with the mutinies and desertions of the men whom he was leading.

Raleigh thus failed in the two great ventures of his life, but time was not slow to vindicate him. He lived to see Virginia successfully colonized, destined to become the greatest of the American colonies and the mother state of the American union. Guiana was not occupied by Englishmen in his day, but his book encouraged the Dutch, who became increasingly active along this coast, finding their wealth in commerce and not in mines. Eventually a slender part of the vast tract of country Raleigh claimed as by the law of nations belonging to the Crown of England passed from Dutch to English hands, though it has been far from realizing Raleigh's hopes. "The Spaniards," Raleigh wrote, "cannot endure that the English nation should look upon any part of America." The challenge that he threw down to that exclusion was maintained with increasing vigour through the Stuart age, when England laid broad and firm her power on the mainland of the northern continent and in the West Indies, and grew in wealth and strength with the growth of her empire as Raleigh had predicted, while the power of Spain waned and her monopoly passed away. The work was done not by the conquest Raleigh designed in Guiana, nor by the open war of which he was the advocate, but by the sea-power he had helped to build up and the colonization to which he pointed the way. That was the enduring result to which his failures led. When Bacon summed up the experiences of the Tudor age in the dry analysis of his essay on plantations, from which all the enthusiasm of the Elizabethans had disappeared, he wrote, "plantations are amongst ancient, primitive and heroical works," and surveying Raleigh's and other failures, he gave the soundest of counsels as to their foundation. The vast gains, the limitless potentialities that always floated before Raleigh's sanguine imagination had faded on the horizon, but the idea of plantations as distinguished from trade and empire had definitely taken hold of England. Wisdom is justified of her children. Colonization, as Raleigh maintained, was England's road to greatness: and though through longer and more toilsome experiences than he had supposed, England was yet destined to realize the vastest of his dreams.

E. A. Benians.

THE HYDROGRAPHY OF THE YUNNAN-TIBET FRONTIER

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ON the Yunnan–Tibet frontier, extending southwards along the frontier of Burma also, the supreme structural feature is the parallel arrangement and close proximity to one another of the great mountain chains separating the Tibetan-born rivers Yangtze, Mekong, and Salween. Issuing together from a narrow breach in the plateau-rim between the eastern end of the Himalaya uplift and the western end of the great watershed of China, these parallel ranges, however formed, have determined, at least in part, the upper courses of these rivers, as they now flow. It is of the minor structures raised on these massive foundations, not of the great ranges and rivers themselves, that I intend to write.

The drainage through what may be called the Sino-Tibetan gap flows southwards, parallel to the dividing ranges of granite, slate, schist, and limestone which, whether as actual prolongations of the Tibetan plateau or as independent uplifts (a question to be decided by future exploration), separate and enclose them. The rivers themselves from their birth set out eastwards, under the influence of the Central Asian east-and-west trending axes, but gradually they curve round through a right angle and flow southwards, breaching the rim of the Tibetan plateau as they change direction in conformity with the change in alignment of the mountain ranges.

On the flanks of the breach, through which the hurrying waters crowd southwards, the tendency is for the rivers to spread out fanwise and flow off east and west as the Yang-tze and the Brahmaputra, but the central rivers, hemmed in, continue southwards, crushed close together by the wall-like ranges.

These ranges, however uplifted, are features of original structure, as, indeed, so far as we are concerned here, are the river gorges between them. Later additions are the tributary valleys, with the peaks, passes, spurs, outliers, and similar minor features carved from them. The distinction is relative; simply, it is claimed that the parallel mountain chains, with their longitudinal rift-like valleys, fashioned in the long-distant past, have stood till now substantially as they were formed, during which time those details which make up the general scenery of the region, were engraved on them.

Since the main ranges trend from north to south, and the great rivers flow parallel to them, the tributary streams flowing down the flanks of the divides flow east and west.

Now the width of the divides is so inconsiderable, that although all the heavy rain comes from one direction—the south-west—yet that flank of the divide does not receive an appreciably heavier rainfall than does the other flank, though, on the other hand, the easternmost ranges, owing to their being screened from the impinging rain-clouds by the high ranges

further west, against which the moist winds first beat, do receive a progressively diminishing rainfall.

It is clear from this that no marked contrast is to be expected between streams flowing down one flank of a range and those flowing down the other, nor is any such difference found; further, that the westernmost range will be the most dissected by running water, the easternmost least; though, owing to the dense protective forests which, called to life by the adequate precipitation, clothe the former, contrasted with the nakedness of the latter, the resulting appearance is in each case considerably modified.

But with the spurs which, thrusting out east and west from the main divides, are thus blocked out, the case is different. These spurs present flanks to north and south in a region of heavy snowfall, and the contrast in the vegetation on the two slopes is apparent at a glance, and an index of conditions sufficiently different to have far-reaching consequences.

On north-facing slopes, trees (chiefly Larix and Picea sp.) extend to over 15,000 feet, and a thick tangle of scrub (Rhododendron, *Berberis Juniperis*) prevails to over 16,000 feet; while on south-facing slopes tree-growth ceases much lower down, and scrub-growth also somewhat lower. With the more scanty covering of vegetation on south-facing slopes occurs a marked accumulation of scree material. This contrast in the vegetation is a direct effect of the difference in aspect on north-facing and south-facing slopes. On the former, the lingering snow, protected from the spring sunshine, protects in turn the young plants and such seeds as are germinating, and, melting but gradually, ensures to them a constant supply of water.

On south-facing slopes the snow melts rapidly with the returning warmth, and is rudely stripped from the plant carpet at a critical moment, allowing the weakling plants to be exposed to rapid changes of temperature, involving considerable extremes; cold winds, too, play havoc with the delicate seedlings. In the second place this rapidly melting snow causes a volume of water to sweep down the mountain-side, doing great execution by direct attack. Here the poverty of vegetation reacts again. No soil can accumulate, since all the smaller rock *débris* is at once swept away by the water, which is consequently still less impeded in its abrupt descent, and the steepness of the slope depends on the angle at which the fallen material can rest. On the one flank, facing south, we have therefore steep rocky screes with a highly adapted flora of scree plants, poor in varieties; on the other, facing north, a gentler slope covered with a tangled carpet of dwarf shrubs, supporting a thin veneer of soil in which numerous plants can find foothold.

Into the question of plant-life under these abnormal conditions, however, I do not propose to enter here; it is sufficient for our purpose to note changes in the vegetation as indicating a change in the physical conditions, and to inquire first what change has taken place, and, secondly, what other changes does it involve.

If we look at a map of the Yunnan–Tibet frontier region, we notice a marked tendency amongst tributary streams to flow due south parallel to the main rivers, sometimes for a considerable distance, only turning east or west, as the case may be, to join abruptly the main river. The great divides having no thickness, it is evident that a stream simply flowing down from the crest-line for the very few miles which separate it from the next trough, would gather only a small volume of water to itself, as is in fact the case; but many of the tributary streams are of considerable size —are indeed rivers, and this volume they attain by flowing throughout most of their course parallel to the main river, collecting water over a large area. This fact is at once impressed on the traveller who voyages northwards along the frontier, as the smaller valleys, where existent, are utilized for the route in preference to the more difficult gorges of the main river. Moreover, the arid craggy troughs through which the Yang-tze, Mekong, and Salween have made their way offer scant opportunity for cultivation amongst their inhospitable cliffs and desiccated screes, most of the settled population being found away up on the flanks of the ranges.

These tributary streams have their birth, often in glaciers, far up under the peaks of the main watershed, and flow through comparatively open valleys, where are, in summer, broad meadows of gay flowers and mixed coniferous and deciduous-leaved trees; gradually the valley narrows, and tall cliffs grip the thundering water till, swinging abruptly round at right angles, the torrent grinds its way noisily through a jagged-walled arid gorge, and finally plunges into the main river.

This "reversed" valley, narrowing from a broad source in the mountains to a deep chasm at its confluence with the main valley, is characteristic of the region. It might seem, since the unusual—nay, unique —arrangement of the main divides has determined the parallel flow of the big rivers, that the tributary streams flow south for the same reason that they do; that is to say, that the tributary valleys are features of original structure. But every side valley shows clearly that it was carved out by running water, or, in its upper reaches, by ice, while there is nothing to show that the great troughs, though deepened by water, owe their existence to its action; indeed, such evidence as there is points to a tectonic origin. Moreover, the natural course of every tributary stream is down the flank of the main divide, and since some streams follow this course, while others show intermediate stages between this and the extreme south-flowing type, some other reason must be sought.

Consider first an ideal uplift (Fig. 1). Rain, falling equally on either flank of the divide, gives rise to streams which, cutting their way back at the head, block out peaks, separated by cols, thus producing an irregular crest-line. Spurs are formed buttressing the main watershed in the usual way. In the next stage, rain falling on the north and south flanks of these spurs starts a series of tributary streams, flowing north and south, as seen in Fig. 2.

Now, in consequence of that more rapid melting of the snow on south-facing slopes, evidence for which we have seen in the vegetation clothing them, streams flowing in this direction, coming down in spring spate, cut their way back at the head more rapidly than do those flowing idly and

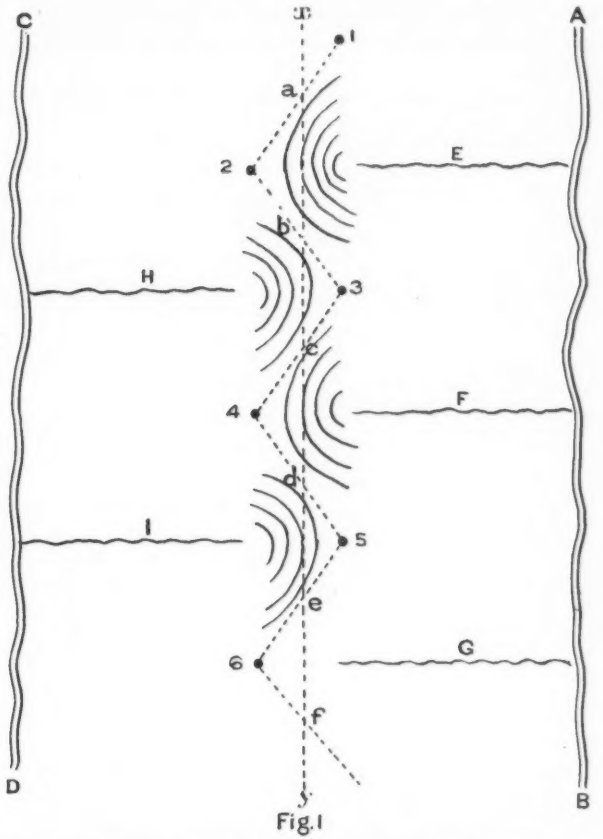


Fig. 1

The straight dotted line *xy* is the axis of original uplift; the zigzag line is the final watershed. AB, CD are main rivers; E, F, G, H, I tributary streams with cirques at their heads. 1, 2, 3, 4, 5, 6 are peaks on crest of main divide; a, b, c, d, e, f are cols between the peaks. The figure is drawn in recollection of a similar diagram in Professor Marr's 'Scientific Study of Scenery.'

with greater regularity—owing to the control exercised by the carpet of vegetation with its entangled soil-film—down north-facing slopes. The result is that, cutting thus rapidly back at the cirque, the south-flowing stream presently taps the headwaters of the next main tributary valley to

the north. Next, the increased water-supply enables the swelling stream to cut its channel deeper, while the beheaded stream in its lower course dwindles to a small current, or entirely disappears. At the same time the outline of a barrier range, flanking and parallel to the main range, is marked out. The cutting-back process proceeding, a second stream further north is beheaded, and gradually a spur running more or less diagonally from the middle flank of the range of the main river is carved out (Fig. 3).

Meanwhile the continual cutting back of all south-flowing streams at

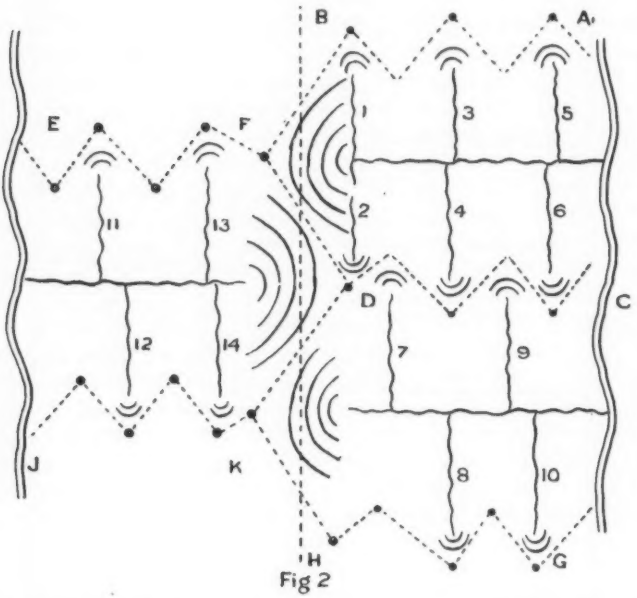


Fig 2

Peaks and cols as in Fig. 1. Nos. 1, 3, 5, 7, 9, 11, 13, are south-flowing streams from spurs AB, CD, EF; 2, 4, 6, 8, 10, 12, 14, north-flowing streams from spurs CD, GH, IK.

the cirques broadens the head of each valley, and with the capture of stream after stream, the original pirate stream, swollen with waters from every direction, still further scours its valley. (But some of the wide valley-heads are ice-worn.)

Lower down, however, especially along that part of its course which remains of the original east or west flowing stream, the waters are more confined as there is less lateral abrasion, the channel being already dug deep; at the same time the vastly increased load which the torrent now transports enables it to corrode its channel vertically with great rapidity.

The decrease in its powers of broadening the lower valley and concentration of effort at deepening it are due to two causes. In the first place, the extreme local aridity as the main trough is approached protects the walls of the gorge, which are attacked neither by rain nor by extreme variations of temperature. In the second place, throughout the frontier region the rocks, at least from the main troughs to an altitude of 12,000 or 15,000 feet, stand nearly vertical, and the strike runs about north-north-

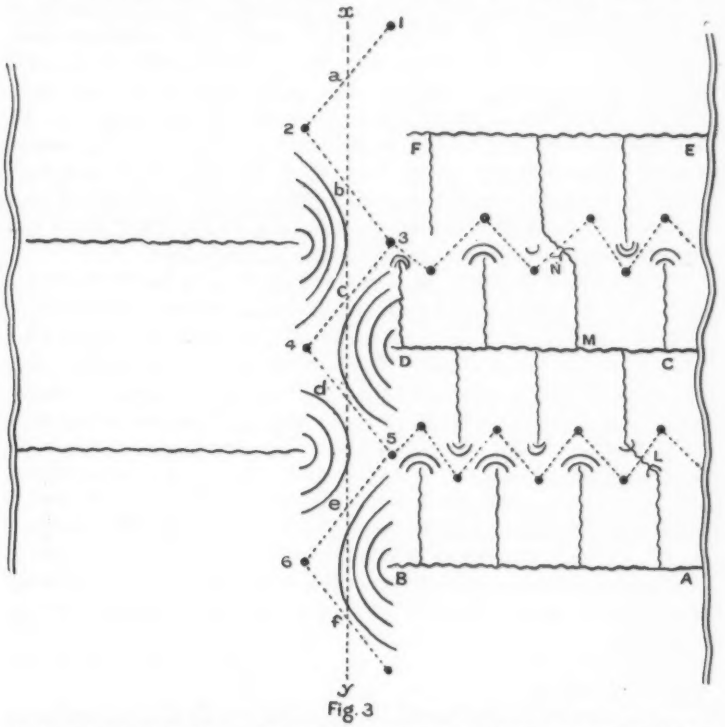


Fig. 3

Peaks and cols as in Fig. 1. The south-flowing stream AL of the main tributary AB has cut back through the spur at L, and tapped the next main tributary CD. MN has similarly tapped EF.

east to south-south-east, or even nearer the north and south line. Consequently, streams flowing in a north and south direction follow a course more or less along the strike of the rocks, while those flowing east and west cross the strike. In the case of schists and slates or shales, standing on edge, the former direction at right angles to the cleavage planes is the line of least resistance; as long as the stream follows the strike, the tendency is for it to cut a broad valley; when it cuts across the strike the tendency is for it to cut a narrow jagged-edged gorge. At high

altitudes also the effect of extreme temperatures and of rapid heating and cooling along the cleavage helps to widen the valley.

Indeed, even north-flowing streams may benefit from the advantage thus conferred by the strike of the rocks, and cut their way back sufficiently to tap a small stream to the south, as seems to have been the case with the stream flowing down to the Mekong from the Londre-la.

Eventually, owing to these changes, we find a long south-flowing and a short north-flowing branch of the main tributary. The barrier range to which these changes have given birth also sends small tributaries down either flank, on the one side to the main trough (recognizable by their size as not originating under the crest of the main divide, and often tumbling straight over the precipice, as in the "granite gorge" on the Salween above Cham-p'u-t'ong), on the other to the south-flowing stream. On the original lateral valleys, from which the headwaters have been stolen by the restless activity of these south-flowing streams, and on such valleys as are altogether ignored by them, absorbed in their greedy and headlong work, certain characteristic features are impressed.

Where a tributary stream from the main divide joins the south-flowing stream (which has crossed its valley and worked further north), there is often a waterfall, owing to the more rapid cutting down of its bed by what is now the main stream. The waterfall on what is now the main A-tun-tzw stream, coming down from the crest of the Mekong–Yangtze divide just below the village, seems to have been formed in this way. Originally the present source-stream probably flowed north through the shallow hanging valley above A-tun-tzw, to Adong. The south-flowing A-tun-tzw stream, cutting back at a lower level, tapped it and diverted it south over a fall, stranding the upper part of the Adong valley, where a lakelet has been formed by a barricade thrown across by a side stream.

Again, many high-level valleys are left in the air owing to the turning of their water-supply and rapid deepening of the main channel. Other stranded or "hanging" valleys along this frontier were formed by the over-deepening of the main valley by water while the tributary valleys were filled with ice.

Hanging valleys—flat meadows with lakes or meandering streams—may also occur on the crest of the main divide, especially if a stream on one flank of the divide cuts back into a stranded valley on the opposite flank. The flat summit of the Londre-la (12,000–13,000 feet) on the Mekong–Salween divide is a hanging valley left in the air by the south-flowing stream running down to the Salween, and isolating Francis Garnier Peak (see Fig. 4). Similarly the south-flowing A-tun-tzw stream has isolated the massive outlier due west of the village, completely severing it from the Mekong–Yangtze divide.

Though it is scarcely profitable to point out detailed examples of the structures described, in a region so comparatively unfamiliar, still those acquainted with Major (now General) Davies' map of Yunnan will recog-

nize in the A-tun-tzw and Doker-la streams, and in those flowing from the Tsa-lei-la and Pai-ma-shan, most of the principles involved, as here set forth.

We have then an apparent confusion of ridges, valleys, peaks and outliers with waterfalls, valleys left hanging in mid-air, smoking screes and rushing torrents; then turning to the vegetation, we find meadows surrounded by flower-clad precipices occupying the broad alpine valley heads, magnificent mixed forests lower down, pine-clad slopes fronting

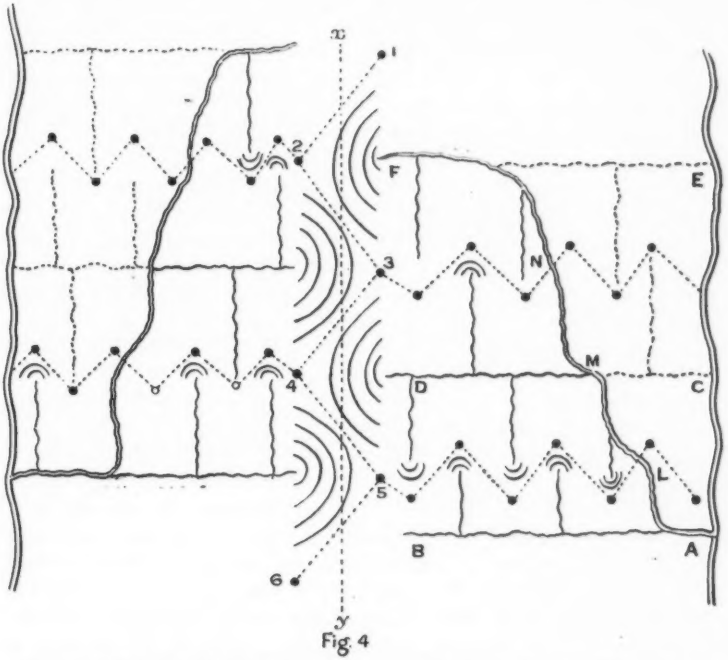


Fig. 4

Lettering as in Fig. 3. Finally resulting south-flowing streams are shown by double line. The upper part of valley CD may be left in the air, owing to rapid cutting down of main stream; and there may be a fall at M. A barrier range is blocked out in the area AEF, streams flowing east and west from it.

the dry river gorges, stark screes with scattered plants, and in the deep valleys of the extreme west an approach to tropical jungle. On north and south facing slopes we find, as already pointed out, a marked difference both in the character and composition of the vegetation, and similar differences still more pronounced are met with as we pass from the easternmost range (the Mekong–Yangtze divide) to the westernmost (the Salween–Irrawaddy divide). Finally, we have to note that, owing to the isolation of barrier ranges by the activity of south-flowing streams,

their floras also are isolated more or less, with results well worth investigating.

While therefore, as described in a previous paper read before the Society, many of the hanging valleys and lake basins found at high altitudes on the Yunnan–Tibet frontier, owe their existence to a former generous extension of ice on all the main ranges, others are to be explained as a result of the unequal abrasion of north and south slopes; while also no explanation is offered of the main tributary valleys with broken backs (water or ice falls) nor of looped rivers (to be referred to presently), yet if the selective action of this principle as a sculpturing agent is fully realized: if the part played by a former unequal but universal extension of ice on the several ranges, is recognized, and the fact that these co-workers are in turn subordinate to a single control, namely, the prevailing south-west rain-bearing wind, owing to which the westernmost ranges tend to be washed away more rapidly than the arid easternmost ones, and consequently the westernmost rivers to be filched from their deep beds by yet deeper rivers and drawn headlong westwards —if these three sculpturing and denuding agencies are fully grasped and their several scopes defined—then I believe that the apparently inextricable tangle of spurs and tortuous river courses cease to present that overwhelming confusion which first greets the eye.

How far the argument cited above can be carried—whether by itself it is sufficient to account for the extraordinary courses met with in certain rivers of this region—is another matter. It is not difficult to see that, under certain conditions, a river might be forced to turn back on itself several times, and flow in a W-shaped course. But though the parallel loop does occur in several rivers along the Yunnan–Tibet frontier, and perhaps nowhere else in the world under similar conditions, still it is comparatively speaking so rare, and so striking an occurrence, that each individual case demands separate consideration; for doubtless the conditions are not precisely the same in each case, as for instance with the Ngawchang-hka on the rain-washed Burma side of the frontier, and the Wi-ch'u in the arid heart of south-east Tibet. Courses so whimsical in rivers as far asunder as the Ngawchang-hka, the Wi-ch'u, the Yangtze and the Yalung, which all display this feature more or less marked, cannot be explained by a formula.

In a paper published in the *Geological Magazine* ("Further Geological Notes from the Land of Deep Corrosions") in 1915, I stated that the folded and metamorphosed rocks found in all the river valleys led me to believe that, while the closely woven loops of such rivers as the Wi-ch'u and the Yangtze (at Likiang) resulted from the linking up of two originally distinct rivers flowing in opposite directions, such beheading of one stream by the other might be the result of earth-movement; in fact, movement in one direction combined with movement in another at right angles to the former, giving rise to a screwing motion. Such

movements may have actually taken place, giving rise to the east and west trending folds of the Himalayan ranges on the one hand, and to the north and south trending folds of the Yunnan–Tibet frontier on the other. But while there is good reason to believe that such rivers are in fact formed by the confluence of two originally separate streams, the junction may also be effected by the gradual and unequal cutting back of streams as described above, a process which can be seen, in all stages of accomplishment, now at work.

The Wi-ch'u deserves a few words to itself. Like other main tributary streams of the frontier region, it flows due south throughout the greater part of its course and turns abruptly to join the Salween; but before reaching the confluence it indulges in the remarkable wriggle referred to, turning backwards and forwards on itself, loop lying against loop, where the river has impetuously torn its way out through the grandly savage mountain range as though lost in the wilderness and blindly seeking an exit. It is possible to stand on a ridge of rock, and looking down 1500 or 2000 feet, to see the river flowing due south on the one hand and due north on the other, so that it requires an effort of imagination to believe that it really is the same river. Such a wriggle would, of course, occasion no surprise in the case of a river meandering across a flood plain; but when it rushes through deep gorges, with stark rocky mountains capped by snow-peaks towering on every side, the effect is staggering. However, it would need a longer exploration of the valley than I devoted to it to say exactly what has happened, and I must leave it at that.

We may now draw attention once more to the influence this parallel arrangement of the main troughs and tributary valleys has on the people of the country, and on communication between valleys. Travelling up the main river gorges, along which lie the routes between Yunnan on the one hand and Ssuchuan and south-east Tibet on the other, very little cultivation is seen, and the population is correspondingly sparse; owing to the scarcity of rain, all fields need to be terraced and irrigated.

As already remarked, the tributary streams from the main ranges slit the valley walls with narrow jagged gorges, entrance to which is gained with difficulty. The roads from one main valley to the next, however, always follow the main torrents, that is, those flowing more or less south; similarly the roads up the big rivers often leave the main valleys and cross the spurs well up the flank of the divide, though there is generally an alternative track through the deep chasm where the big river rolls boisterously along.

Thus in Fig. 5 to cross from A to C it is necessary to follow the route ADC, while the route up the main valley AB lies parallel to but back from the main river, crossing the cols between the long south-flowing and short north-flowing streams, and turning back to the main trough through the narrow gorge where the joint stream breaks through. Thus crossing from valley to valley, the main peaks of the divide are

always outflanked, and though the route is made longer, the gradient is made easier than it would be in case of a frontal crossing of the main divide. The journey from Londre, on the Mekong, over the Doker-la to Aben on the Salween, is an instance of the first; that from the Mekong below A-tun-tzw, *viâ* that village and Adon, over the Tsa-lei-la and down to the Mekong again at Yâ-kâ-lo, an example of the second.

Once the difficulty of entering the tributary gorge has been surmounted, the valley begins to open out; cultivated slopes and villages are seen, and higher up broad alpine pastures. In fact, in the narrow Mekong basin at least, the population, hidden away behind the spurs and barrier ranges of the containing walls, considerably exceeds that of the main valley. It is

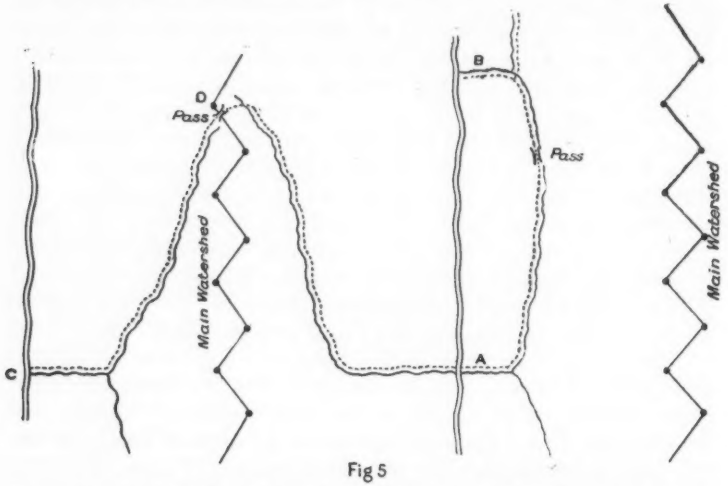


Fig 5

The route from A to C follows the south-flowing streams *viâ* D. Route from A to B follows the inland valleys higher up the flank of main divide, instead of keeping to main trough.

a new world which is opened up to the traveller behind these inhospitable and apparently impenetrable cliffs between 8000 and 12,000 feet high.

To what extent the facilities for intercommunication between the main troughs thus afforded have influenced the peoples of this region it is not easy to say. The routes from south-east Tibet into Yunnan, followed by large numbers of caravans each year, some of which come down as far as Burma, owe their existence to these valleys, and the recent westward movement of the Lisus from the Salween into the Burmese hinterland seems to be a direct result of this ability to cross apparently insuperable mountain barriers with comparative ease. Thus there is by no means that segregation of types one might expect to find in valleys so jealously isolated from one another, such differences as exist being dependent rather on climatic causes. For example, in the rainy region of

the Salween, which extends as far as 28° N., we find Lisus and (near the 28th parallel) Lutzw, giving place suddenly to a Tibetan tribe similar in appearance to the Mekong Tibetans, as soon as the arid region is reached, separated by a gorge, passable at certain seasons, and no more than a few miles in length.

Similarly, in the wetter southern portion of the Yunnan Mekong we find Chinese types, and in the arid northern part a Tibetan type; and there is a far wider difference between the tribes north and south of the Salween gorge just referred to than there is between the Tibetans of the Salween and those of the Mekong in the arid region, separated though these latter are by the vast bulk of the Mekong–Salween divide.

On the other hand, considerable as is the difference in appearance between the stone-built houses and irrigated terraces of the arid valley, and the timber houses and cultivated slopes of the higher flanks of the divide, there seems to be no difference between the valley and the alpine Tibetan of the Mekong basin.

There is one further point in the hydrography of this region, which must be briefly referred to, since it is perhaps the most important sculpturing agent, in its effects, at work on the region to-day. I mentioned at the beginning that the rainfall on either flank of any of the main divides was not appreciably different; at the same time, the western-most ranges, acting as rain screens, receive a far heavier rainfall than do those lying further east. Consequently the snow-line on the Salween–Irrawaddy divide is much lower than it is on the Mekong–Yangtze divide, and this in turn brings other effects in its train.

But the chief point is, that the rain-bearing winds, beating up from the south-west, are impinging first on the Salween–Irrawaddy divide, and the tendency is for all watersheds to move eastwards, and hence for the water to flow, ultimately, not south, but west.

Thus the lesser principle, that tributary streams flowing east or west to a flank behead those lying to the north, one by one, is included in the greater, that the western main rivers will eventually behead and completely divert those further east.

A TRANSYLVANIAN BOUNDARY FOR RUMANIA: NOTES BY COLONEL R. ROSETTI (RUMANIAN ARMY) AND COLONEL SIR THOMAS HOLDICH

THE following notes have been communicated by the President for publication. The first is an extract from a letter written by a distinguished officer of the Rumanian Army, Colonel R. Rosetti, in criticism of certain passages in the recently published book: 'Boundaries in Europe and the Near East,' by Sir Thomas Holdich, reviewed in the October *Journal*. The second note is the author's reply.

I. Extract from letter by Colonel R. Rosetti to Colonel Sir Thomas Holdich.

1. On p. 117 you say: "Dobrudgea, which is a weak extension of territory, which adds nothing to the strength of Rumania from the strategic or military point of view." I am entirely of a different opinion and maintain that, apart from the ethnographical and economic * points of view, Dobrudgea is a necessity to Rumania from the strategic point of view. If Dobrudgea did not belong to Rumania it would be ceded to Bulgaria. This would give Bulgaria the advantage of having, for her armies, a zone of concentration from which they could separate easily, at the beginning of operations, Wallachia from Moldavia. Actually a single line of railway unites Dobrudgea to Bulgaria, but the advantages of concentration in Dobrudgea are such that it will decide Bulgaria to build new ones. Wallachia is the greatest and by far the richest part of Rumania, and if Bulgaria concentrates her armies in Dobrudgea, Wallachia will have to be abandoned, for it will be impossible to concentrate in Wallachia, by the only railway line Mărășești–Focșani–Buzeu, all the troops from Moldavia and Bessarabia (the line Reni–Galați–Braila being under enemy fire); and besides it would be imprudent to do it, as the enemy would concentrate his forces quicker in Dobrudgea and threaten to cut completely the army from Moldavia and Bessarabia, the distance between Galați and the Carpathians being only 120 miles. The only thing to be done would be to concentrate all the Rumanian army in Southern Moldavia and Bessarabia. But this solution also would have two drawbacks: (*a*) It would be impossible to transport from Wallachia all troops, depôts, etc., by the single railroad Bureu–Focșani–Mărășești. (*b*) It would, as I have said above, abandon to the enemy by far the richest part of Rumania.

To resume: the cession of Dobrudgea, from a military point of view, helps the aggressive policy of Bulgaria and makes it impossible to Rumania to defend herself.

2. Talking about our future Western frontier (the one which would separate us from Hungary), you say (pages 117, 118): "Wherever the dividing line west of Rumanian Transylvania may be drawn (and there have been several suggestions) there is no prospect of basing it on strong natural features. . . . This, then, is the great problem for Rumania to solve—whether the gain of three million people and the consequent accession of fighting strength (and it would make of Rumania the most formidable fighting state in the Near East), combined with the economic advantage accruing from so promising a territory as Transylvania, would be balanced by the possession of an indefensible boundary, beyond which there must ever lie in wait a powerful enemy, anxious to retrieve a lost territory, and only restrained (or not restrained, as the case may be) by coercive influence of greater Powers. The Transylvanian Alps and

* Rumania would have no other ice-free port than Constanța, and studies have shown that it is impossible to build any port between the Dniester and Constanța.

Carpathians are not as the Italian Alps or the Pyrenees, but they form, nevertheless, a great defensive barrier of inestimable value. Is it wise for a country which, like Poland, lies between the hammer and the anvil to part with such an advantage?"

From this it would appear that Transylvania is an open country on its western side. Now this is not the case, and this will make itself apparent by a careful look at a map, which shows that, to the north of the mountainous massif of the Banat (whose peaks are over 4000 feet high, Piatra Temenicu being 1447 metres), a powerful system of mountains, named by the Rumanians the Metallic and the Bihor Mountains, forms the western side of Transylvania. These mountains, whose general direction is north-south, go from the Mureș (Maros) to the Sameș (Szamos) where they unite with the Lapos Mountains, a branch of the Carpathians. The backbone of these mountains, forming the water divide between Tisa (Theiss) and Mureș and Tameș, begins near Deva, on the Mureș, follows heights (in metres) 1046, 1264, 1349, 1497, 1792, 718. The dimensions of this massif are 160 kilometres north to south and 130 kilometres east to west. Except in the valleys of the Mureș to the south of the massif, and Sameș to the north of it, only one railway line, from Cluj (Klausenburg) to Oradia Mare (Grosswardein) and two roads, one from Cluj to Oradia Mare and one from Alba Tulia (Karlsburg) to Zarand, traverse it from east to west.* No through communication from north to south exists. The mountains are precipitous and Avram Taucu's resistance in these mountains in 1848 shows that the whole massif forms an excellent barrier, or as you call it an excellent natural frontier. It is this massif the Rumanian armies wanted to reach in 1916, but had not time to do it owing to Lexitzki's Russian army failure to advance from Bucovina to the Sameș valley (Bistrița), as was specified in the military convention between the Allies and Rumania, and to Mackensen's attack in the Dobrudgea.

If then the frontier were to be traced somewhere between this massif and the Theiss, where a good ethnographical frontier could be established, Greater Rumania would have a four-square boundary, which you say, speaking of Bulgaria (page 75), renders a state territorially compact, with great power of military concentration. The centre of Rumania would be Transylvania, which would constitute a four-faced redoubt of which the sides would be powerful mountains (parapets) of over 3000 feet height. This redoubt would be surrounded: on the east by a long natural glacis ending on the Dniester and Black Sea (Moldavia and Bessarabia); on the south by another glacier going to the Danube and Black Sea (Wallachia and Dobrudgea); on the west by a very short glacis towards the plain of the Tisa (Theiss).

* The spelling of names in Colonel Rosetti's letter is generally Rumanian, even for the names outside the present boundaries of Rumania: thus Tisa for Tisza (Magyar), or Theiss (German). Klausenburg is the German name for Magyar Kolozsvár; Grosswardein is Magyar Nagy-Várad, and Karlsburg is Magyar Gyulafehérvár.—Ed. *G.J.*

It would give Rumania "space and opportunity for internal development such as may remove all incentive for discontent and desire for encroachment on other preserves" (page 5); it would be based on "unity of sentiment, expressed in the will of the people concerned, to which we must look as the best guarantee for peaceful settlements within definite boundaries" (page 7); it assures Rumania "space for fair development" (page 11).

It would certainly make "Rumania the most formidable fighting State in the Near East" (page 118), and that would allow her to form, in alliance with the Jugo–Slavs, the bulwark against any German (and I add Hungarian) aggression in South-Eastern Europe which you advocate (page 55).

I should be very grateful to you if you would agree to have these objections, and any answer you may see fit to make, published in any daily paper.

II. Note by Colonel Sir Thomas Holdich in reply to the Criticisms of Colonel Rosetti.

All loyal Englishmen wish well to Rumania, and I (believing that a strong Rumania would prove a powerful factor in the maintenance of peace in the Balkans) am anxious that the problem of her western boundary should be studied from every reasonable point of view. Clearly, since the military strength of Rumania must depend largely on man-power, the acquisition of Transylvania is of the greatest importance, and here I am so much in sympathy with Rumanian aspirations that I have followed Colonel Rosetti's suggestions with the deepest interest. Broadly, he points out the value of a line which, starting from Deva on the Maros in western Transylvania, north of the Benat, could be carried in a north-westerly direction along a system of mountain divides to the culminating ridges of the Bihor massif, and thence north-east to a junction with the Lapos branch of the Carpathians. The weak points geographically in such a boundary are evidently to be found in the latter section (especially where it crosses the Samos River), whilst its weakness ethnographically is that it leaves to the west a large area within which 95 per cent. of the population is Ruman. It should be noted, too, that in the Banat, south of the Maros, there is a population majority of Rumans. In order to include as much of the Ruman people as possible Colonel Rosetti proposes a line somewhere to the west of that traced above, between the line of crests and the Theiss River. This would involve geographical difficulties which I have already pointed out in my book, and which I need not repeat. Colonel Rosetti does not mention the Magyar occupation of a considerable area of Transylvania enclosed in the bend or elbow between the Carpathians and the Transylvanian Alps, which, from the ethnographic point of view, is a serious difficulty in the settlement of the Transylvanian problem, especially with the near prospect of a declaration

of independence on the part of the Magyars. All the same I sincerely hope that Rumanian aspirations may be realized.

As regards the Dobrogea position, may I be permitted to point out that I did not at all overlook the possible advantage to Bulgaria of the occupation of territory south of the Danube and directly commanding the weak strategic position afforded by the junction of Wallachia and Moldavia. But there are obviously two ways of regarding the military possibilities which might arise from the advance of a hostile force across the Danube at this point. It might, of course, happen as Colonel Rosetti suggests, that such a force would be capable of dividing the defensive armies of Wallachia from those of Moldavia, and of defeating them separately. On the other hand, *provided that the military strength of Wallachia were fully developed independently of Moldavia*, it appears to me that the dividing force would find itself in the awkward predicament of being threatened on both flanks, with the Danube behind it. Colonel Rosetti maintains that Wallachia would have to be abandoned in face of such an advance on the part of Bulgaria. Here I fail to follow him. Why should not Wallachia be rendered capable of defending herself against any such contingency?

A SEVENTEENTH-CENTURY JAPANESE MAP OF THE WORLD

A VALUABLE gift has been made to the Society's collections by Mr. Post Wheeler, lately attached to the United States Embassy at Tokyo, in the form of an excellent reproduction, made under his instructions, of a Japanese map of the World painted in colours on a bed-screen about 1653. The map is of much interest as a specimen of native Japanese work at a time when European knowledge was first gaining a footing in that Empire, and particularly so when compared with the Chinese World-map of Matteo Ricci described in the *Journal* for October 1917, although its smaller size, later date, and comparative lack of detail hardly entitle it to so important a place among the cartographical monuments of the past.

The screen on which the map is painted is one of a pair, the other containing a detailed map of the Japanese islands, in which every province is delimited, and the name of each *daimyo* given with his territorial boundary, while on the reverse side is a list of the *nengo* (chronological eras) of Japan. It is to be wished that this too may be made accessible by a reproduction, for its interest is bound to be great as a sample of early Japanese cartography of their own country. Mr. Wheeler says that the screens were certainly painted in the era of Sho-o (1652–55), since the list of *nengo* ends with that era and the then ruling emperor

(Go-Komyo) is spoken of as "present reigning." That they were originally owned by the *Daimyo* of Echizen province (the modern Fukui-Ken) is shown by the fact that for that province alone the *Daimyo's* name is not given—it being no doubt thought superfluous to mention his name in his own domain. They are now the property of Mr. Takashi Masuda of Tokyo. Incidentally Mr. Wheeler mentions that two similar pillow-screens (*makura biobu*), which were used in the sleeping-chamber of Tokugawa Iyemitsu, third Shogun, are preserved in the Nikko temple.

The map of the World can be seen at first sight to be founded on European models, as such a map must obviously have been at the date in question, if based on anything better than guesswork for regions at a distance from Japan. We know moreover that such European sources were used in Japan at the time, though we are not aware that any map of so early a date has yet been reproduced. Describing his second journey to the Japanese Court in 1692, Kaempfer ('History of Japan,' Maclehose's reprint, vol. 3, p. 177) tells us that he was shown specimens of Japanese maps then in use. He says: "Then two maps were brought in, one of which was without the names of countries and places, otherwise well enough made, and in all likelihood copied after an European map. The other was a map of the whole world, of their own making, in an oval form [no doubt after the model of the oval maps of Ortelius], and marked with the Japanese Kattakanna characters." This second map was of interest from its representation of the countries beyond Japan to the north, still almost unknown to Europeans. Von Siebold, in his monumental work on 'Nippon,' published in 1852, has an interesting section (Band 1, Abt. 1, pp. 122–145) on the history of the discovery by the Japanese of their own and neighbouring countries, which throws some light on the general development of geography in the Japanese Empire. As in China, scientific geography had its beginnings only after the arrival of Europeans, though rough coast-charts, town-plans, and local maps of a pictorial or diagrammatic character were previously in use. European science here made its way more slowly than in China, in spite of the fact that the Jesuits began their labours thirty years sooner in Japan than in the latter country. According to Von Siebold it is to the Chinese works of Ricci and his coadjutors that most of the progress eventually realized is to be ascribed. In the early part of the seventeenth century the missionaries had a hard struggle to maintain their own position, and on the final banning of Christianity and expulsion of the Spaniards and Portuguese it was only the commercial intercourse still permitted to the Dutch that afforded a restricted channel for the diffusion of European knowledge.

This being the case it is only to be expected that the Japanese author of a map drawn about 1653 would base his work principally on Dutch models, more especially as Dutch cartographers had come still more to the front by 1650 than in Ricci's time. And this is quite borne out by Mr. Wheeler's map. Looked at broadly there is a strong general resemblance

between it and Ricci's map, both alike being based on the works of the Dutch-Flemish school, but points of detail emphasize the influence of the *Dutch* element. As with Ricci's map, no one European map can be said to have supplied the model, but we have rather the result of comparison and compilation from separate maps—an evidence of the interest in world-geography taken at the time in some circles at least among the Japanese. For certain parts of the map, however, the adherence to older models, in preference to those followed for the greater part, is something of a puzzle.

The map is rectangular, and, including a border of about $\frac{3}{4}$ inch, measures $39 \times 16\frac{3}{8}$ inches. The sea is coloured a rich deep blue, and certain territorial divisions of the lands, and islands, are also variously coloured, the reason for their selection being not obvious. Lakes and rivers are coloured blue, though the rivers are often but slightly indicated, and many even of the first importance are altogether omitted. No complete degree-net is shown, the only lines drawn being the equator and tropics, with the Arctic circle shown much less prominently, and an indistinct trace of one other parallel in about the latitude of England. Strong vertical lines divide the map into six compartments (possibly those of the screen itself), but are hardly to be taken for meridians. The form might seem to suggest that the map is drawn on Mercator's projection, though this, after its first use by Mercator for his map of 1569, found no great favour with cartographers for a considerable time. But the relative dimensions in latitude and longitude show at once that the Mercator scale of latitude was not employed. The positions of the tropics and Arctic circle relatively to the equator are precisely those entailed by the use of equidistant parallels, which we may therefore conclude to have been adopted. The filling of the whole rectangle by the map seems to exclude the possibility that the model was on the oval projection of Ortelius, yet the shape of the continents in some ways rather suggests that such was employed. The representation of South America, with the west coast sloping strongly downwards towards the *right*, as it does in the oval maps, is difficult to account for on the supposition of *vertical* meridians. Yet we find a somewhat similar deviation from the true direction in one of Ortelius's own maps—that of the Pacific engraved in 1589—where South America would almost seem to have been superimposed as a whole on the degree-net without any allowance for the reversed trend of the meridians in a map in which this continent lies on the right instead of, as in the World-map, on the left-hand side. Something similar may have occurred in the Japanese map. On the other hand, there may in both cases be merely a reversion to the form of South America to be seen in various maps of the earlier part of the sixteenth century. However this may be, we may pretty confidently regard our map as constructed on the projection now known as the "Simple Cylindrical." In this respect it agrees with Peter Plancius's great map of 1592, now at Valencia,

never yet reproduced in modern times, which seems to be the only important printed World-map of the period in which this projection was used. In the Japanese map, it should be noted, the arrangement of the land-masses within the framework is that adopted in Europe, there being no attempt to emphasize the importance of the draughtsman's native country by bringing this into the middle zone of the map.

The complex interrelation of the best European maps of the period makes it difficult to say which, if any, has exercised the greatest influence on the present specimen, but a search for determining features is not wholly without result. The most critical seems to be the representation of the north-east of North America, from the St. Lawrence to the Arctic region north of Hudson Bay, as composed entirely of an archipelago of large islands. This is to be found in none of the atlas-maps of the time, but it does occur in one or two single Dutch maps, namely on Allardt's revised edition (1640) of Franciscus Hoeius's world-map of about 1600, and on Blaeu's map of 1605—both of which appear to be mainly based on Plancius.* In other respects, too, there is a close agreement with Hoeius's map, which however, unlike Plancius's, was drawn on Mercator's projection. Special points of resemblance are: (1) The shape of the Gulf of California, with the widening to the east at its head; (2) the representation of the river-system of South America, with a central lake discharging in three directions: the idea recurs in other maps, but there is most minute agreement between Hoeius and the Japanese map; (3) the drawing of the Solomon Islands and New Guinea, the latter joined to the great southern continent, as in Ortelius's 'America' of 1589. The junction is hinted at in other maps too, and singularly enough the resemblance in this respect is most marked between the Japanese map and Ricci's, the influence of which is perhaps to be traced also in other parts of the map, where the Dutch model is not exactly followed.

Points of general agreement with Dutch and other maps founded on Mercator are: the representation of northern and north-eastern Asia (with the Tazata Island of Pliny), and the insertion of the Obi and its gulf, with the lake (Kithay of other maps) in which it was supposed to originate; the drawing of the lakes in the interior of China after the pattern set by Ludovicus Georgius in his map engraved by Ortelius in 1584, and also of the fabulous Lake Chiamay in northern Indo-China, giving birth to four great rivers, which had so great a vogue for over a century. The line of the great wall of China is to be recognized by the curve given to it also in the European maps of the time; it too made its first appearance in Georgius's map in Ortelius. The great lakes of Central Africa are shown, though here as elsewhere the rivers, including even the Nile, are omitted.

The main points of divergence from maps of the Hoeius type consist

* The archipelago in question does not appear in Plancius's smaller map of 1594 in Linschoten.

largely in the retention of certain features characteristic of the earlier maps of Mercator and Ortelius—most of them also shown by Ricci. The general shape of North-West North America recalls both Ortelius and Ricci. In the interior Mercator's great lake of fresh water, connected with the Arctic Ocean by a river, is to be seen, as well as his three smaller lakes to the east, belonging to the St. Lawrence system. Mercator's four great Arctic islands are still shown, and there is no recognizable representation of Novaya Zemlya, correctly shown on all the later Dutch maps. In the south we still see the Java Minor of Polo (really Sumatra) placed, as by Mercator, in the great gulf of the southland south of the Malay Archipelago. The incorrect drawing of South America already referred to is another point of divergence, as is also the general looseness of copying of the European coastlines (noticeable too in Ricci) and the tendency to exaggerate the coast indentations generally, by which the shape of the lands, and particularly of the islands, suffers considerably. Lastly, as was to be expected, there is a great improvement in the outlines of Korea and of the Japanese Islands. This merits brief discussion in a special paragraph.

One special feature not yet mentioned is the supply of small inset maps of the northern and southern hemispheres. Such were already given in 1592 by Plancius, who in his address "Geographiæ Studioso" speaks of the insets definitely as of *hemispheres*. Hoeius gives insets of the northern and southern regions, but these extend only to 50°. In spite of their small scale the Japanese insets show a somewhat unusual care to make the outlines conform to those of the main map.

The improvement in the drawing of Korea and the Japanese Islands might suggest to some that native sources had supplied the means of correction, but this is not likely. For the topography of the interior such native material did exist, though based, as Von Siebold says, on mere compass work, and making no pretence of laying down places with exact geographical co-ordinates. But such early Japanese maps as are available give little indication of precision in the drawing of the form of the islands. One reproduced by Teleki in his great work on the historical cartography of Japan (Plate 12), though dating from so late as the beginning of the eighteenth century, makes no attempt to show the characteristic curve of the island group, which instead forms a nearly straight band running due east and west. But there were in existence at the time European charts which gave quite a good approximation to the true shape of the islands. Even in 1595 Ortelius had been able to include in his atlas a map of Japan (by L. Teisera) which erred chiefly in the east to west direction given to the main axis of the group, and was little inferior to Mr. Wheeler's map except in the misrepresentation of Korea as an island and the omission of Yezo. Ricci too gave a good general idea of the shape and relative position of the islands. By the middle of the seventeenth century the activity of Dutch navigators had

further added to precise knowledge, and the relatively advanced state of this about the time in question is well shown by the anonymous Portuguese chart in the Paris National Library reproduced by Teleki in his collection (Plate 5, No. 1). These early nautical charts are in fact—as was so often the case—far better than many of the later efforts of landsmen, as can be seen by a comparison of the various maps given by Teleki. It is therefore likely that the Japanese, when after the expulsion of the missionaries they began making the first crude maps of their own islands, availed themselves of the European material ready to their hand, rather than that they themselves executed surveys to supply the framework for the topographical detail. But conclusions on this head would no doubt be greatly helped and would also be of more value could we study the large-scale map of Japan shown on the second of the pair of bed-screens.

E. HEAWOOD.

NOTES ON THE EARLY HISTORY OF THE MARINER'S COMPASS

M. Esposito

I.—BRUNETTO LATINO AND ROGER BACON.

A RECENT writer in the Irish periodical *Studies*,* Prof. A. J. Rabilly, dealing with certain publications on Roger Bacon, makes the following statement: "A reliable contemporary account of Bacon's real work at Oxford would be a valuable addition to our knowledge. Hence I venture with much diffidence to quote a passage which (so far as I know) has remained unnoticed and unknown. In the *Monthly Magazine* for 1802 there was published the translation of some letters from Brunetto Latino† to Guido Cavalcanti describing his impressions of a visit to England. The letters are exceedingly interesting and deserve a careful investigation from students of Dante and of English literature. The discussion of their authenticity hardly falls within the competence of the present writer, but there is strong internal evidence of genuineness. Until proof is forthcoming there seems no reason to doubt the authenticity of the following vivid and strangely neglected description of Bacon at Oxford as seen by a sympathetic and cultured visitor." Then follows a long extract from the eighth of these letters, in the course of which occurs the following passage (*loc. cit.*, pp. 254–55): "He (*i.e.* Bacon) further showed me (Brunetto Latino) a black ugly stone called a magnet which has the surprising property of drawing iron to it; and upon which if a needle be

* *An Irish Quarterly Review of Letters, Philosophy, and Science*, 3, September 1914, pp. 252 *seq.*

† *Latino* is more correct than the common *Latini*, cf. Gaspary, 'Early Italian Literature,' translated by Oelsner (1901), pp. 367–8.

rubbed and afterwards fastened to a straw so as it shall swim upon water, the needle will instantly turn towards the Pole-star; therefore be the night ever so dark so as neither moon nor star be visible, yet shall the mariner be able by the help of this needle to steer his vessel aright. This discovery which appears useful in so great a degree to all who travel by sea must remain concealed until other times, because no master-mariner dares to use it lest he should fall under a supposition of his being a magician; nor would even the sailors venture themselves out to sea under his command, if he took with him an instrument which carries so great an appearance of being constructed under the influence of some infernal spirit."

Prof. Rahilly adds that "This realistic sketch of Friar Bacon in his laboratory at Oxford is historically far preferable to the usually accepted account."

In a later communication to the same review (*Studies*, 4, March 1915, p. 128) Prof. Rahilly returned to the subject of these letters and remarked: "I have incidentally noted many internal evidences of genuineness." These "internal evidences of genuineness" would, in fact, furnish conclusive proof of the spuriousness of the documents, had not the author of the forgery, a certain Mr. William Dupré, of London, been compelled to make a full confession. The history of this forgery has been elucidated by the present writer (*Modern Language Review*, 12, January 1917, pp. 59–63), and it would be unnecessary to return to it here were it not for the fact that, contrary to Prof. Rahilly's belief, these documents have been known to, and quoted as genuine by, a number of writers on the history of geography beginning with Heinrich Julius von Klaproth and ending with Prof. C. R. Beazley.

Klaproth ('Lettre à M. le Baron A. de Humboldt sur l'invention de la boussole' (Paris, 1834), pp. 45–6) was apparently the first to cite the passage dealing with Roger Bacon and the magnet, which I have quoted above. His citation was reproduced by d'Avezac,* from whom it passed to Thomas Wright† and to Major ('Life of Prince Henry the Navigator' (1868), pp. 57–59). More recent writers who have been likewise imposed upon into believing in Brunetto's visit to Oxford and in the account of the magnet are Poggendorff (*Geschichte der Physik* (1879), p. 101), Weise ('The Discoveries of America' (1884), pp. 62–63), Nordenskiöld ('Periplus,' Engl. Transl. (Stockholm, 1897), p. 49), Silvanus Thompson (*Proc. R. British Academy*, 1906, p. 378), and C. R. Beazley ('The Dawn of Modern Geography,' 3 (1906), pp. 505, 510–11; 'History,' 2 (1913), pp. 47–48).

No philologist appears to have examined these documents, and it is highly improbable that any scholar would have been taken in by them.

* *Bulletin de la Société Géographique de Paris*, 4e série, t. xv (1858), p. 175. Later, as we shall see, d'Avezac realized that he was dealing with a forgery.

† See his edition of Alexander Neckam 'De Naturis Rerum,' Rolls Series (1863), pp. xxxvii. *seq.*

Thor Sundby ('Brunetto Latinos Levnet og Skrifter' (Copenhagen, 1869), p. 14, n. 2), in his valuable Danish monograph on Brunetto Latino, mentions the publications of Klaproth and d'Avezac and states that he was unable to procure the *Monthly Magazine*, but adds in a footnote that Prof. Van Mehren had informed him that d'Avezac then (1869) believed these letters to be false.

The names of Brunetto Latino and of Roger Bacon must therefore cease to be quoted by historians of geography as landmarks in the early history of the compass.

II.—A Neglected Source.

The history of the compass during the Middle Ages has been set forth by Nordenskiöld ('Periplus,' pp. 47–50) and by C. R. Beazley ('The Dawn of Modern Geography,' 3, pp. 508–11). Neither of these writers was acquainted with the following interesting account of this instrument as used by Venetian sailors probably early in the fourteenth century. It occurs in chapter 21 of an anonymous philosophical tract entitled 'Tractatus de fascinatione,' which is found in the Munich MS., cod. lat. 16192, fols. 204*a*–213*b*, written in 1377, and also in two later manuscripts.* This tract has not yet been printed, but a few short extracts from it were given by G. M. Thomas (*Sitzungsberichte der philos.-philol. Classe der Münchener Akademie* (1875), Bd. ii, pp. 225–230). It is not possible to fix definitely the date of the composition of this work or the nationality of the author from the brief passages made available by Thomas, but we shall perhaps not be far out in assigning it to the early fourteenth century. It is apparently of considerable interest and would be worth printing in full. The passage dealing with the compass may be rendered into English thus: "That in the greater world the movement of the higher active principles does not cease when that of the lower ones comes to a stop, is proved by the motion by which the magnet attracts iron. In this motion a double principle may be assumed: firstly, a lower and inherent one which is the specific property of the magnet itself, and, secondly, a superior and external principle which is the pole-star, which is the cause of and on which depends the attractive power of the magnet. But the iron having been moved and attracted by the lower principle through the agency of the magnet, on removing the power of the magnet the pole-star still continues to move the iron, that is the stilus or iron needle, so that it turns the point of the stilus or needle in a straight line towards the pole itself and fixes thus the direction of the journey.

This I personally saw at Venice devised by the intelligence and labour of sailors who have to navigate in the darkness of night. They take a semicircular bronze table and fix a stilus at its centre, and from that point

* One at Munich, cod. lat. 5338, fols. 384*a*–397*b*, sæc. xv., and one at Vienna described by Denis ('Codices Manuscripti Theologici Bibliothecæ Palatinæ Vindobonensis,' 1, pars 2, cols. 2215–2216).

they draw lines to the circumference. At the tops of these lines they write down the names of the cities and harbours and their distances from one another. And underneath the table they make a rapid circular motion with a magnet. As a result of this motion the stilus moves continuously and in the same direction. At length the sailor suddenly withdraws the magnet and flings it into a vessel of water which he keeps behind him. The stilus or needle, notwithstanding the removal of the magnet, continues through the agency of the pole to move for a full hour, until it comes to a stop and turns its point directly towards the pole. From which guidance the sailors immediately see according to the lines drawn to the circumference towards what part of the heaven they must direct the ship in order to arrive at the desired port or destination."

In addition to the works of Nordenskiöld and Beazley mentioned above, and to the literature cited by them, it is indispensable that students of the history of the compass should consult the following memoirs (not cited by Mr. Beazley though all published before the appearance of his volume): D'Avezac, "Aperçus historiques sur la boussole" (*Bull. Soc. Géog. de Paris*, 4e série, t. 19, 1860); V. Rose, *Zeitschrift für deutsches Alterthum*, 18, 1875, pp. 321, 339, 409–13; Bertelli, "Studi Storici intorno alla bussola nautica" (*Mem. Pont. Accad. d. N. Lincei*, 9, 1893); U. Moretti, 'Sulla scoperta della bussola nautica e sulla storia della Repubblica Amalfitana,' 1904 (Congresso Internazionale di Scienze Storiche, Roma, Aprile 1903, *Atti* No. 10).*

NAMES IN MANCHURIA

MANY of the geographical names in Manchuria are Mongol, of which we have the Russian and the Chinese versions, but usually not the original Mongol. Many other names, though Chinese, have, owing to the Russian ownership of the railways, become current in their Russian form, which, though generally a systematic version of the Chinese syllables, gives the names an appearance not always easily recognizable by those familiar with Chinese names romanized on the Wade system.

The following list includes most of the cases, found in the preparation of the Manchuria sheet of the Asia 1/5M series, which are likely to present any difficulty. The Russian maps to which reference is made are the 40-verst of Russia in Asia and the 100-verst Communications map.

* Reference may also be made to the curious controversy carried on in the pages of the *Rivista Geografica Italiana*, 1900 *seq.*, and elsewhere, by Bertelli, Porena, Botto, and Posteraro. See also Casanova, 'La Carta Nautica di Conte Freducci' (Firenze, 1894), pp. 16–17.

M.A. refers to the Atlas of China published by the China Inland Mission; J. to the official Guide to Eastern Asia published by the Imperial Japanese Railways. The form of the name given in the last column is the Postal Guide, or a close approximation to what the Postal Guide would give if the names were included in it. A study of the syllable-for-syllable correspondence between Russian and Chinese will be some guide to the Post Office rendering of other Chinese names obtained through the Russian. Thus, *Dyan* regularly equals *Tien*, *Syan* equals *Hsien*, initial *G* becomes *K*, and *B* becomes *P*. The principal difficulty will be found in the variants *ch*, *ts*, and *k*, due to the divergences between the northern and southern pronunciation, the Postal Guide inclining to the southern form even for northern names: see, for example, Chien-chin-chai.

While many of the variants in the list are systematic, others are evidently mistakes, as Daimakoj; a third class arise from uncertainty or alternatives in the Chinese names, as Kai Chou for Kaiping hsien. The most serious aspect of the case is that the Chinese versions, rendered official by the Postal Guide, are very unsatisfactory renderings of the Mongol, as Pokotu for Bukhedu or Buchatu.

In the preparation of this list we have received great help from Dr. Lionel Giles of the British Museum, and Mr. A. G. Ellis, Assistant Librarian of the India Office. Mr. J. H. Reynolds and Mrs. Leach have done the greater part of the work on the Russian maps and the search in the Chinese Postal Guide.

A. R. H.

Ajikhe (100 v.)	**Ashiho**
An-dun-syan (100 v.) or Antung-hsien (J.)	**Antung**
Bayansusu (40 v.) or Baiansussu (M.A.)	**Payenchow**
Beitszya-sume (40 v.)	(probably) **Peikiao**
Bei-tszi-fu (40 v.)	**Peitzefu**
Bodune (40 v.)	**Petuna**
Bukhai (100 v.) or Puhai (M.A.)	**Wuhai**
Bukhedu (100 v.) or Buchatu (M.A.)	**Pokotu**
Butkhan (40 v.) or Butcha (M.A.)	**Pusi**
Chalun (100 v.)	**Tungkalun**
Chandekhekou (40 v.)	**Changtienhokow**
Chi-chia-pu (J.)	**Kikiapu**
Chien-chin-chai (J.)	**Tsienkinchai**
Ch'ing-tui-tzŭ	**Tsingtuitze**
Chjalai-nor (100 v.)	**Dalainor**
Daimagou (100 v.) or Daimakoj	**Taimakow**
Duitsinshan (100 v.) or Tunchisan (M.A.)	**Tuitsingshan**
Fadzantun (100 v.)	**Fankiatun**
Fin-khuan-chen (40 v.)	**Fenghwangcheng**
Fusin (40 v.)	**Fowsin**

Fuzin (40 v.) or Fu-chin (J.)	(probably) **Futsin**
Gai-chjou (100 v.) or Kai Chou	**Kaipinghsien**
Gaolintszi (100 v.) or Gaolin (M.A.)	**Kaolingtze**
Gao-tsyao (100 v.)	**Kaokiao**
Gou-ban-tszi (100 v.)	**Kowpangtze**
Guan-nin-syan (40 v.)	**Kwangning (hsien)**
In-kou (100 v.)	**Yingkow**
Inma (100 v.) or Yin-ma-ho (J.)	**Imaho**
Khaichen (100 v.)	**Haicheng**
Khandaokhetszi (100 v.)	**Hengtaohotze**
Khapyuchan (40 v.)	**Hwapichang**
Khuanjen-syan (40 v.)	**Hwaijen**
Kuan-dyan-syan (40 v.)	**Kwantien (hsien)**
Lamadyantszi (100 v.) or Lamadian (M.A.)	**Lamatientze**
Manchuria or Manchjuriya Station (100 v.)	**Manchouli**
Mongol (M.A.) or Mangou (100 v.)	**Mangu**
Mudantszyan (100 v.)	**Mutantsiang**
Mulin (100 v.) or Muren (40 v. and M.A.)	**Mulingchan**
Myandukhe (100 v.)	**Mientuho**
Nyan-tszi-shan (100 v.) or Nintsishan (M.A.)	**Nientzeshan**
Ongun (M.A.) or Yuan-gun (40 v.) or Vangun (100 v.)	(perhaps) **Wankung**
San-Chakhe (100 v.) or ? Sitau (M.A.)	**Shihtowchengtze**
Shakhedzi (40 v.)	**Shaho**
Sin-min-tin (100 v.) or Hsin-min-t'un	**Sinminfu**
Sin-tszin-tin (40 v.) or Hsing-ching (J.)	**Hingkingfu**
Sipingai (100 v.) or Shihpingkai (M.A.)	**Szepingkai**
Si-Tumet (40 v.) or T'u-mo-tê or Hsi(west)-t'u-mo-t'ê-tung (Chinese map)	**Tumote**
Suyatun (40 v.)	(probably) **Sukiatun**
Syaosuifun (100 v.) or Syaosuifin (40 v.)	**Suifenho**
Syaosingintsza (40 v.)	**Shenchingtze**
Syun-e-chen (100 v.) or Siongyocheng (M.A.)	**Siungyocheng**
Taipin-zau (40 v.)	**Taipingshao**
Takhisan (40 v.)	**Tahushan**
Telin (100 v.)	**Tiehling**
Tiuza (40 v.)	**Kiuchan**
Tkhuminza (40 v.)	**Tumenling**
Tsin-chjou-fu (100 v.)	**Chinchowfu**
Tsyan-vei (100 v.) or Ch'ien-wei	**Tsienwei**
Tszin-An-syan (40 v.)	**Tsingan**
Tszyanchan (40 v.)	**Chienchang**
Tushety-tsin-van = Ho-shê-t'u-shih-yeh-t'u-ch'in-wang-fu (Chinese map)	
Tyan-chjuan-tai (100 v.)	**Tienchwangtai**
Udzyadjan (40 v.)	**Wukiachan**

Utszimi (100 v.) or Udimi (M.A.)	Wukimiho
Utszya (100 v.)	(probably) Wukiatze
Vaitsagou (40 v.)	Waichakow
Veishakhe (100 v.)	Weishaho

GERMAN PLANS FOR RAILWAY DEVELOPMENT IN EAST AFRICA

Map following p. 332.

Etat für das Ostafrikanische Schutzgebiet, auf das Rechnungsjahr 1914. Denkschrift über den Bau einer Bahn nach Ruanda. (German White Book.)

Die Kolonialbahnen mit besonderer Berücksichtigung Afrikas. F. Baltzer. Berlin, 1916.

Die Ruandabahn. Max Moisel. *Deutsche Kolonialzeitung*, 30, 1913.

and other works.

RUANDA is described as a land flowing with milk and honey, a country where cattle thrive and agriculture flourishes; add to these attractions the natural beauties of its high tablelands, which are well populated; its healthy climate; its fruitful earth; and its rivers which never run dry, and it is not surprising that it should have attracted the attention of many explorers, from the time when Speke, on his journey in 1861, passed through the eastern portion of this country. In 1894 Count von Götzen visited it. Ten years later Richard Kandt published his remarkable work 'Caput Nili,' giving a comprehensive account of his journeys through Ruanda and Urundi: subsequently, Duke Adolph of Mecklenburg passed through accompanied by a scientific staff, on his way to the Congo; to these must be added the names of Dr. Hans Meyer, Drs. F. Kolbe, Moisel, and others whose journeys, reports, or maps have been given in German official and other publications from time to time. Sir Alfred Sharpe, in his paper "The Kivu Country" (*G.J.*, January 1916), gives a pleasant account of the country, and of its inhabitants, the aristocratic Watusi, numbering about 40,000, and the industrious Wahutu, about two million. The population is said to be increasing rapidly.

With a view of opening up these countries plans for railway development were under consideration by the Germans, one of the chief projects being the construction of a line from Tabora to the Kagera Bend, as recommended by Dr. Schnee, then Governor of German East Africa, who, in order to arrive at a decision upon the merits of various proposed railway routes, undertook, in January 1913, a journey to Ruanda, accompanied by a technical commission. After an exhaustive investigation of the conditions of the various districts through which it was suggested the lines should pass, Dr. Schnee arrived at the conclusion that the only route to be recommended at all was a line from Tabora to the Bend of the Kagera River. This would require a line of about 450 kilometres, or 370 miles in length, branching off at Tabora from the Central Railway and passing north-west through Usumbwa and Usambiro to the confluence of the Ruvuvu and Kagera rivers: the "Kagera-Knie." The details of the project which follow are in the main taken from the German White Book. The map is reduced from plans on the scale 1/100,000 found on the occupation of Tabora, for which we are indebted to the courtesy of the Ministère des Colonies de Belgique. This map, which differs very greatly from the German map of

East Africa 1/300,000, is an acceptable addition to our knowledge of an important piece of country whose topography was very little known, but is of especial interest as including a section of the watershed between the Nile and the Tanganyika affluents.

For several reasons it was decided that Tabora is the most advantageous point of departure for the projected line. The most thickly populated portions of this district, free from the tsetse and well stocked with cattle, lie in the north-west: more to the west the country is thinly inhabited, and upon this ground, as well as for technical reasons connected with the avoidance of the districts flooded by the Gombe River during the rainy season, any point of departure west of Tabora is out of the question.

From Tabora it was proposed the line should run northwards, through Unyanyembe and the thickly populated and well-stocked districts of Karundi and Kahama. The first stretch of the line as far as Kahama presents no serious physical obstacles; the ground is easy to work; stone and sand are found in abundance; and the large xerophilous forests would provide wood for construction and burning: long bridges and viaducts will not be necessary; but the water supply would require some consideration.

The proposed line would cross the Gombe River at a point some 30 miles north of Tabora at the 48th kilometre, and passing through Mogwa—a district covered with thorn bushes and high-grass steppe—would reach Karundi, where at the 95th kilom. there would be a station at an altitude of 1240 metres. From here the line would go on through the valley of Kayambo, leaving the forest-covered Ukuzule Mountains on the right, to a station to be called Kahama at the 130th kilom. at an altitude of 1460 metres. This station is the point from which the suggested north-eastern branch line to Mwanza would start. The line would next be carried on north-west through the pastoral district of Kahama, into the district of Msalala, through open high-grass steppe country, crossing longitude 32° 20′ W. in a north-westerly direction at the 200th kilom. (124 miles) from Tabora in lat. 3° 30′ S. From this point over bush-grass and sandy clay soil, the trace goes on through the district of Mbogwe still in a north-westerly direction through the Ugomba district, leaving the mission station of Mariahilf, the principal station of the White Friars and the seat of a bishopric, to the south.

From kilom. 205 to 310 there are stretches of myombo forest, which lie between the inhabited districts, and it is here that the tsetse fly is found. As far as the 300th kilom. there would be no difficulties in construction, for the conditions are the same as on the Tabora–Kahama section, and suitable material is to be found in abundance. After crossing the Mohama River the line would reach Usambiro, which belongs to the district of Bukoba. This country is well populated, and there are large fields and herds along the proposed line of railway. It is only in the southern part of the district near Nyatakara, and some miles from the proposed line, that the tsetse occurs, and never in the north and west. After leaving Usambiro, it would curve round the base of the Kisenge Mountain, and leave the village of Nyamasina, an Arab and Indian settlement, to the south. The caravan route which goes from the Military Post in Usuwi to Nyatakara is crossed near here at an altitude of 1300 metres. Near kilom. 330 the River Mtundu is crossed, and here the line would enter the Sultanate of Usuwi. From Usuwi the line would cross the River Nyakando, to the western slope of the Msonge Mountains, ascending the Nyarwambo valley to an important pass which divides the mountain ranges of Ihigi and Kasingeyne, reaching at kilom. 349 an altitude of 1420 metres above the sea. The

trace is then carried along the Asahungo valley with easy gradients into the Midaho valley, and reaches at kilom. 367 the River Mweruzi, which here divides the districts of Usuwi from Uha. Hence it follows the north-east boundary between these two districts, up the valley of the Mweruzi, and then at kilom. 381, after crossing the river a second time, it once more enters Usuwi, at an altitude of 1300 metres. Near the village of Doma it follows a tributary of the Mweruzi as far as the Tawiro Mountains. To this point few difficulties in construction would be met, the formation of the country and the soil being favourable. Bridges could be constructed without difficulty, and building material is everywhere to be found. Further on, however, the same favourable conditions do not obtain: the ascent to the second important pass at kilom. 404 in the Tawiro Mountains—and thus on to the watershed between Lakes Tanganyika and Victoria—will require viaducts and cuttings: the difficult portion is 8 kilom. (5 miles) long, and the line would ascend the pass from a height of 1445 metres to 8550 metres. It is a question whether a deep cutting at the summit would not be more advantageous than a tunnel.

An alternative route would be to take the line round the mountains east of the Mweruzi River at Kanyoni: this would have the advantage of easier gradients, but it would have the drawback of being longer than the northern line. From an economic point of view the southern route would have the advantage, for it would open up the district of Uha, the proposal being to construct two railway stations there. On the other hand the line from Kanyoni to the east, as the official report points out, would go through more sparsely populated regions; while the northern line, as far as the boundary of Bukoba, touches well-populated districts.

From the pass over the Tawiro Mountains the line descends the Masigera valley, crosses the Pangola River at the 411th kilom. at a height of 1500 metres, goes southward round the Msumba Mountains, through the district of Kasarasi, reaching kilom. 422 at a height of 1410 metres.

The western descent from the mountains to the Ruvuvu valley, and on to the bend of the Kagera, the "Kagera-Knie," presents no further difficulties, and the conditions for the construction of the line are favourable in spite of the hilly ground. The earth is sandy clay with rocky subsoil, and stone and sand are everywhere at hand for building purposes and for ballast, while the water conditions are very favourable on the last stretch from Usambiro to the Kagera Bend, where the line would terminate. The Ruvuvu valley is eminently suited for a railway line, as the forest conditions and the flat lands covered with great thickets of reeds and papyrus, hold back the force of the floods to a large extent, and, in addition to this, the subsoil is firm.

With regard to the names used here, it may be remarked that while the boundaries of the administrative and judicial districts into which the German Government divided and subdivided the country are usually plainly indicated, the actual limits of the various sultanates and districts are seldom defined with any clearness.

The feeders for this railway would be the four great rivers, the Nyawarongo, the Ruvuvu, the Kagera, and the Akanyaru, which are navigable for considerable distances, and therefore are important factors in the development of the country.

The Nyawarongo is so called in the German official report ('Etat für das Ostafrikanische Schutzgebiet 1914') from Kigali to its confluence with the Ruvuvu at Kagera-Knie; but in the map, which illustrates the report ('Uebersichtskarte der Eisenbahnen nach Ruanda, Tabora, Kagera-Knie,'

etc.) the name Nyawarongo for this river is shown only to its junction with the Akanyaru, and from that point to the Kagera Bend it is called the Kagera. According to the measurements taken in March 1913, the Nyawarongo had mostly an open course of 29 metres in breadth, both sides bordered by papyrus; but its upper reaches varied between 35 metres and 60 metres in breadth; the superficial speed of the current was 0·35 metre per second, the average depth at the confluence was 5·2 metres, the average above the confluence 4·0 metres, and the discharge about 84 cubic metres per second. In July 1909, during the dry season, it was found to be navigable for 250 kilom. from the Ruvuvu confluence to 40 kilom. above Kigali, where rapids begin. There are no real obstacles on this stretch, and the depth at this season, in 1909, was found to be 1·20 metres or more. The breadth of the river was then adequate along this whole stretch for boats 15 metres long, 3 or 4 metres broad, and drawing 1 metre.

The Ruvuvu was measured in March 1913 over a distance of 30 kilometres, with the following results. Above the confluence the open river is 37·5 metres broad; the speed of the current is 0·91 metre per second; the depth at and about the confluence is 5 metres; and the discharge is 177·5 cubic metres per second. Already in 1908, and again in March 1913, the river was surveyed between two points which are described in the German report before mentioned, as (1) the boundary between the districts of Uhimba and West Usuwi, and (2) the confluence with the Kagera. The measurements in 1909 were taken in the dry season, and those in March 1913 at high water. This whole stretch of river is suited for navigation: the depth varies between 1·50 metres and 6 metres; the banks are steep and firm; along two-thirds of the way they are covered with bush, and the remainder bordered by papyrus; the river is mostly 30 to 60 metres wide. It is known that on the upper stretch of the river there are rocks near Sagatwe, but very little else is yet known of the upper Ruvuvu, except the statement of Dr. Hans Meyer that this portion of the river is unsuited for navigation owing to rocks and rapids.

The Kagera descends, at a point 300 metres below the confluence of the Nyawarongo with the Ruvuvu, in a series of rapids which consists of one principal fall of about 20 metres and then a stretch of rapids extending for nearly 300 metres. Below the rapids the Kagera is again navigable for over 150 kilometres to the so-called northern Kagera Bend, that is to the point where the river turns to the east. The river here has a depth of about 5 metres, and an average breadth of between 40 to 60 metres.

The connection of the lower river with the southern Kagera Bend and with the upper navigable reaches of the river could easily be provided by a short line round the cataracts: there are also favourable conditions for constructions of importance, such as elevators; or for the provision of an inclined plane, should that be thought advisable.

The Akanyaru, according to the report of Dr. Kandt, the Resident in that district, is navigable for boats as far as its southern bend, a distance of over 80 kilom. At its narrowest it has a breadth of 10 metres, and an average depth of about 1·50 metres.

Several large lakes are connected with the rivers Nyawarongo and Akanyaru—the Chohoha Lake, the Rugwero, the Sake, the Ruwinda, and the Kanzigara lakes. They are connected partly by open channels, partly by short marshy papyrus stretches, through which channels could be easily cut. All the lakes possess, according to the German official report, sufficient depth of water for navigation, and owing to the peculiar form of these lakes, and

especially the Chohoha Lake, which stretches to the south in a narrow arm with many creeks far into the land, very large districts could be opened up by water communications.

Without taking into account the lake waterways, the rivers are navigable for 500 kilom., and the natural centre for all is the southern Kagera Bend, at the confluence of the Ruvuvu with the Nyawarongo or Kagera: a line carried to this point would serve a region much larger than that opened up by the railway alone. These waterways, along almost the whole of their courses, run through very thickly populated districts, with the exception of Karagwe and the north-east of Ruanda.

Thus the region of Kisaka, in which the proposed terminus is situated, is thickly populated, as is the basin of the Nyawarongo. The Akanyaru is well populated on the left bank, thickly in the district of Isawi; on the right bank in the north well populated, in the central portion thinly, and again in the south thickly populated. Finally, the Ruvuvu is thickly populated on the left bank all the way, but on the right bank only in the district of West Usuwi.

The German report from which these facts are taken points out that, even if the river system were less favourable for navigation, it would be necessary, in view of the mountainous character of Ruanda and Urundi, to endeavour to reach the Kagera Bend by a railway, because any trace for a railway in these countries would always, owing to the hilly character of these highland districts, be obliged to follow the river valleys.

While the decision to adopt the route advocated by Dr. Schnee was apparently arrived at by the authorities for the reasons mentioned above, and also because a branch line could be carried to Lake Victoria, avoiding the necessity of continuing the Northern Railway, a somewhat different route has been traced and strongly urged by Pater van der Burght, the Superior of the Order of the "White Friars of Algiers," who is acknowledged to be one of the greatest authorities on this country and its peoples. He is of opinion that the route proposed by Dr. Schnee and his commission is, in the best interests of the colony, a mistaken one.

According to him the line should turn west-north-west at a point about a day's march north of Tabora, and go through the district of Shirambo, across the marshy lands of the Mbuga River, through a large myombo forest into the district of Uha; then crossing the saddle joining the valleys of the Lumpungo and Kayongasi rivers, it would cross the watershed between the Mlagarasi and Kagera rivers, and would follow the Ruvuvu and its tributary the Kinyanguru northwards, almost along meridian 30° E., then down the Akanyaru and turn west through the heart of Urundi and Ruanda to Lake Kivu. By this plan these magnificent highlands, with their hundreds of thousands of labourers, would be opened up, and incidentally also the plains some 30 or 40 miles west of Mariahilf, in the western part of the district of Usumbwa, through which the Muyowosi River runs, which, according to Van der Burght, form a splendid cotton-growing country.

As against this, what advantages does the proposed Government route offer? Pater v. d. Burght points out that such a line would really no more than skirt Urundi and Ruanda, and would, according to him, run through poor and thinly populated districts; while the Tabora-Kivu line, on the other hand, though it is 200 kilometres or 124 miles longer than the one suggested by Dr. Schnee, would traverse the country of the Warundi and Wanyaruanda, where much native labour is available; natives who would be of no use elsewhere, and who would die off rapidly if sent down to the hot climate of the coast. For

connecting Ruanda and Urundi with the western shore of Victoria Nyanza three routes have been under consideration, all presenting considerable difficulties of construction :—

1. A line from Kigali to Bukoba.
2. A line from the Bend of the Kagera to the Bight of Kimoani.
3. A line from the Bend of the Kagera to the Bight of Namirembe.

A line from Bukoba would have to start from the Bay of Lubembe ; this bay, however, which at first sight seemed to offer such promising facilities, is in reality quite unsuited for the purpose. The small island of Kishaka at the mouth of the bay is too far off shore to give any shelter from the strong south-east and north-east winds ; the only place on the Lubembe peninsula affording some shelter and sufficient depth is its southern shore, but just here the banks are high and steep, so that no suitable place could be found for harbour and customs buildings, and behind this, inland, are swamps and low-lying country. The other parts of the beach are exposed to the south-east winds and the waves they cause ; thus harbour and town buildings could hardly be erected anywhere, and only at very great cost.

Leaving the Bay of Lubembe on its way to Kigali, a line would first have to cross the hills over 200 metres high which divide the valley of the Ngono from the lake : after this, until nearing the Ikimba Lake, the course would be easier. Two days' march from this lake is the beginning of the Karagwe country, which continues until the line reaches a point a day's march beyond the Kagera, in a westerly direction ; this part was formerly well populated and full of cattle, but is now mostly uninhabited and unfruitful. The heights are chiefly bare or covered with thick bush, and the valleys either dry and waterless or swampy and covered with papyrus. Besides this, on the east of the north-south stretch of the Kagera River there is a series of rugged mountain ranges with deep valleys, and the construction of a line over them, and especially the descent to the Kagera, would involve heavy expense.

The Kagera River is crossed most easily at the Ishangi ferry, but this would involve a heavy outlay, for the crossing is 2·5 kilometres broad and throughout has a depth of 4 to 5 metres ; from the Kagera, round the north shore of the Ihema Lake, the line would have many steep gradients, and then descending into the lowlands of the Mohazi Lake, it would be obliged to wind along the south shore of the lake and its outlets before then going on to its terminus in the Kigali district.

Owing to the nature of the ground to be traversed, the extreme steepness of the gradients, the many sharp curves, and the bridges and tunnels which would be necessary, the construction of a line along this route would present formidable difficulties, and the cost of building and maintenance would be almost prohibitive. For these reasons the idea of making a line from the Bight of Lubembe to Kigali was definitely abandoned by the German report.

Consider next a line from the Bight of Kimoani to the Kagera Bend. It may first of all be mentioned that according to the 'Denkschrift . . .' in the White Book "the Ruiga River, which descends from Usuwi, does not, as is shown in many maps, flow into Victoria Nyanza, but into the Urigi or Burigi Lake at its southern end." According to this authority, the Bight of Kimoani is a very unsuitable spot for the terminus of a railway line, or for a harbour. At the southern end of it is a large papyrus swamp ; east to west the mountains approach the shore so close that it would be impossible to erect the necessary buildings, and the bay is narrow and only partly sheltered from winds and waves.

According to Dr. Hans Meyer ('Beiblatt zum Ergänzungsheft Nr. 6 der

Mittheilungen aus den deutschen Schutzgebieten vom Jahre 1913') and the report of a technical commission, this line, in order to get from Victoria to the district of the Burigi Lake, would have to ascend from 1133 metres to an altitude of 1510 metres, and then descend again to 1185 metres. Between the Burigi Lake and the Chorero valley, the map attached indicates many cross valleys and ravines, very hilly country with gorges 50 to 100 metres deep ; and since these ravines, as is the case on the Bukoba-Kigali route, have direction throughout from north to south, the traverse would present almost insuperable difficulties for a railway. Rather than follow this route, the line could, after descending to the Burigi Lake, follow the shore of the lake to the Chorero valley, but further on there is a pass at 1690 metres. There is a fall of 440 metres from the edge of the plateau to the bottom of the valley, in a distance which as the crow flies is only 5 kilom. Thence the descent to the Kagera Bend, to 1365 metres, would be difficult and costly, and in the opinion of the German experts, almost impossible to carry through. If the line were brought in from the north, a tunnel of 400 metres would be needed at the falls below the bend, and steep gradients and sharp curves would be necessary, as well as costly viaducts and other works. The whole distance as the crow flies is only about 100 kilom., but the project would involve a line of more than 2½ times that length to overcome the gradients necessary.

Careful study of the district of East Usuwi has shown that the construction of a line from the Bend of the Kagera to the Bight of Namirembe would also meet with many obstacles, and as far as the Military Post of Usuwi would traverse very sparsely populated districts. Soundings along the coast of Victoria Nyanza south of the Bight of Kimoani have shown that a place for a sheltered and roomy harbour does not exist, for steep banks alternate with papyrus swamps. Paul Kollman, in his work on the Victoria Nyanza published in 1899, speaks of this portion of Emin Pasha Gulf as affording anchorages and harbours for good-sized ships, but says that broad stretches of dense papyrus are a serious obstacle. Namirembe, the port used by the Germans for the Military Post of Usuwi, is almost the only place at all suitable, though exposed to the east and south and therefore to the winds which prevail here for the greater part of the year. The shore is very flat, and the fairway for large ships very dangerous owing to the shallows and reefs. In the White Book it is stated that the soundings given in the maps of Victoria Nyanza are inaccurate, inasmuch as the surface of the lake has fallen about 3 feet since they were taken. A drawback to the use of Namirembe as a port is that the tsetse fly is found in the whole district south of Namirembe. But the obstacles to the construction of a line along this route are very much less than in the other cases. The trace would follow along the watershed between the rivers which flow north to the Victoria Nyanza and south to Mlagarasi River. The inequalities are much less than on any other route, and only the crossing of the Tawiro Mountains would demand a considerable ascent up to 1550 metres, and would present some difficulty on the east side.

From the foregoing summaries it will be seen that none of the routes for connecting Ruanda directly with Victoria Nyanza can be adopted with advantage, and that the best and easiest way of opening up that country is by the connection with the Tanganyika Railway before referred to. By the least unfavourable route, *viâ* Namirembe and the Kagera Bend, the goods traffic would have to pass over the Uganda Railway, or else over a new line to the lake. In the former case the following distances which are given thus in the German Report would have to be traversed :

On the Uganda Railway	940	kilometres
On the Lake : *viâ* Kisumu, Bukoba, and Namirembe	488	,,
Rail on to Kagera Bend	237	,,
Total	1663 kilom. or 1034 miles	

The German White Book admits that their Victoria Nyanza districts owed their remarkable development entirely to the Uganda Railway ; and while they would gladly have profited by this, they considered that to construct so im-important a line as a "Ruandabahn" dependent on a railway belonging to a foreign government would be the height of unwisdom. They concluded, therefore, that before any Lake-to-Ruanda Railway was made, a line from Tabora to Mwanza, or from Moshi or Arusha to Speke Gulf or to Mwanza should first be constructed. The distances to Ruanda would then be : (*a*) *viâ* the Tanganyika Railway :

Dar-es-Salaam to Tabora	847	kilometres
Tabora–Mwanza	300	,,
Mwanza–Namirembe	180	,,
Namirembe to Kagera Bend	237	,,
Total distance	1564 kilom. or 971 miles	

(*b*) *Viâ* the Usambara line and the Nasa Bight of Speke Gulf :

Tanga–Arusha	439	kilometres
Arusha–Nasa Bight	470	,,
Nasa Bight to Namirembe	267	,,
Namirembe to Kagera Bend	237	,,
Total distance	1413 kilom. or 887 miles.	

With regard to this route, it is taken for granted that the eastern portion of Speke Gulf is adapted for a harbour: this assumption is however scarcely warranted, because according to the most recent reports there are shallows and swamps there which would render it quite unsuitable for the purpose. Therefore Mwanza alone can really be considered a future terminus of a prolongation of the Usambara line, and the distances would be :

(*c*) *Viâ* Usambara line and Mwanza :

Tanga to Arusha	439	kilometres
Arusha to Mwanza	540	,,
Mwanza–Namirembe	170	,,
Namirembe to Kagera Bend	237	,,
Total distance	1386 kilom. or 861 miles	

This prolongation of the northern railway to the Nasa Bight on Speke Gulf was under consideration shortly before the war, and was strongly advocated by Dr. Jaeger in the *Deutsche Kolonialzeitung*. His opinion should carry special weight owing to the travels and investigations which he made all along this route on his journeys in 1904, 1906, and 1907.

In his sketch-map of the projected railway lines, the proposed continuation of the railway from New Moshi to Arusha is given. From here the route suggested by Baumann and advocated by Jaeger would take the line round the base of the Meru Mountain and round the north end of the Manyara Lake, and, ascending the great fault-scarp at a comparatively low altitude, pass between the volcanoes Oldeani on the south and Ngorongo and Zemagrut on the north, and then reach Lake Victoria at the Nasa Bight of Speke Gulf,

after passing through the South Serenge Steppe. In 1913 it was decided by the German authorities (*Deutsche Kolonialzeitung*, September 1913, p. 600) that a commission should assemble to examine the railway projects for connecting Arusha and Lake Victoria, and it was hoped that in the course of a year sufficient information would be collected to enable them to arrive at a decision.

Finally, however, taking into consideration the fact that the length of a direct line from the coast at Dar-es-Salaam to the Kagera Bend *viâ* Tabora would be only 1328 kilometres or 825 miles as against the above 861 from Tanga; and seeing that the Namirembe–Mwanza–Tabora route would have the great drawback of a double transhipment of goods, it would appear that the German authorities made up their minds definitely in favour of the Tabora-Kagera line.

Turning to an entirely different part of the colony, it has been suggested (Fr. Kolbe, *Kol. Monatsblätter*, June 1913) that a line branching at Ngerengere or Mikese from the Central Railway, might usefully be constructed. This line would pass through the rich cotton-growing district of Kissaki, thence it would cross the Ruaha at Kidato, and reach the Ulanga or Kilimbero (as this portion of the river is called) at the old station of Ulanga, or Simianimotos. This line should open up 186 miles of navigable waterways, upon which steamers drawing 3 feet of water can ply throughout the whole year, and an important district, "unequalled for productiveness in all East Africa," would thus be reached. In speaking of navigable waterways, Kolbe refers chiefly, no doubt, to the Ulanga or Kilimbero River, which is navigable as far as the old Ulanga station, near Ngakomai's village, about 40 miles in a straight line from the Shugali Falls. These falls are in the district of "Mtschongotschogotscho," in lat. 8° 30′ S. and long. 37° 20′ E. The navigable portion of the Ulanga River begins at a point only 124 miles distant in a straight line from the eastern shore of Lake Nyasa.

When therefore, later on, a line is constructed, as it doubtless will be, from this point to Lake Nyasa, a through route from the lake to the coast would be established, which would compete with the route to Beira. From the moment when such a branch line from the Central Railway to the Ulanga is completed, and reliable river-transport can be guaranteed, all the traffic from the north of Lake Nyasa should pass this way.

With this, however, the last word on the subject of connecting Lake Nyasa with the coast has not been said, and the fine harbour of Kilwa-Kisiwani would be an excellent terminus for a line which would run thence to Wiedhafen on Lake Nyasa, through the districts of Kondeland and Ungoni—a mountainous country where the Rovuma rises in the Matogoro Mountains. The question, however, of the construction of a southern railway was of more importance before the completion of the Beira line assured to the Shiré Railway direct communication with the sea; and the southern line, as proposed, would not touch those districts which are most suited for white settlement, such as Kondeland, with its fruitful alluvial plain, its villages with giant groves of banana-trees, and its great uplands, which lie about 4000 feet above sea-level, with ravines and valleys in which there is always flowing water even in the dry season; or Ubena, also rich in pasture land and flowing water; or Unika, in the Langenburg district, with its undulating plateaux, which are, in fact, quite as near to the end of the navigable part of the Ulanga River. So that if a railway were made from that point to Lake Nyasa, a southern line would reap no advantage and could scarcely be expected to pay.

Political considerations and forecasts are outside the scope of this article, but whatever may be the future destiny of this portion of East Africa, it is of

interest to note that the German writer, Dr. Meyer ('Das deutsche Kolonialreich') remarks that this great system of lake railways will undoubtedly constitute the nearest feelers towards the sea of the great Trans-African Overland Route; and that these railways, connecting up from the east and from the west, will all trend towards the coming great north and south route, made up of waterways and railroads, the Cape to Cairo Line.

C. P. MACCARTHY.

REVIEWS

EUROPE

Roumania Yesterday and To-day.— Mrs. Will Gordon. London: John Lane. 1918. Pp. xxxii. and 270. *Illustrations.* 10*s.* 6*d. net.*

THE tragic fate which has befallen Rumania, chiefly, it would seem, on account of events in Russia, both before and after the Revolution, is perhaps not so fully known in this country as it should be, and it is certain that before the war relatively little was known of the country by the majority here. Mrs. Gordon divides her book into two parts, of which the first gives a general sketch of Rumania as it appeared before the war, while the second is devoted to a description of the course of events after her entry into the war in August 1916. The Queen of Rumania contributes an introduction and two chapters, and the profits are to be devoted to Rumanian relief funds. The author states that her purpose is to arouse sympathetic interest in the country, and to bring about a closer understanding of its difficulties and sufferings. The book, with its fine photographs and its frontispiece—a reproduction of Raemakers' cartoon—is well fitted to carry out its purpose, but does not contain very much that will be new to those who have studied the subject and have followed recent events. There are, however, some interesting notes on the customs and folk-lore of the people. The part played by rain and water charms in peasant life is emphasized, and is related to the drought of summer. Thus it is noted that a newly wedded wife throws a coin into the well to propitiate the indwelling spirit, while when a pitcher is filled it is customary to sprinkle a few drops on the ground as an offering to the water spirit. So also a widow, who must visit the grave of her husband daily for forty days, leaves water beside it in case the spirit of the dead should suffer from thirst. Again, to sprinkle water before the feet of any one is to do him great honour. Rain-making ceremonies are also said to be performed, but no details are given.

Brief sketches of the Rumanian Vlachs, gipsies, and Jews are given in another chapter, and there is a short summary of Rumanian history.

M. I. N.

Montenegro in History, Politics, and War.— Alex. Devine. London: T. Fisher Unwin, Ltd. 1918. Pp. xi. and 140. *Sketch-map. Price* 3*s.* 6*d. net.*

Like the volume on Rumania reviewed above, the present one has a double purpose in view—to arouse sympathy for a vanquished ally, and to help to raise money for Relief Funds. Mr. Devine's book is however on a smaller scale, and is largely historical and political, the description of present-day conditions being limited to a few pages at the beginning of the first chapter. These give an interesting sketch of the country and its people, bringing out clearly the essentially "primitive" nature of social life within it. Despite the

geographical position of the country, indeed, the mode of life seems to approximate to that which exists among simple peoples in Africa and elsewhere, for the woman is carrier and agriculturist, while the man is fundamentally a warrior and a warrior only. The most fervent of the wishes expressed for a boy at baptism is said to be, "God save him from dying in his bed"! Men physically incapable of soldiering are said to adopt the profession of minstrel, thus taking a vicarious part in the deeds of the warriors.

The account of the Montenegrin campaigns during the present war, however, shows how poor a chance courage of the heroic type, even when supplemented by the advantages due to a country well fitted for defence and guerilla warfare, stands against a modern well-equipped army. Mr. Devine defends Montenegro and her king vigorously against the aspersions which have been cast against both, in connection with the surrender of Mount Lovchen and the last disaster, and much of his book is occupied with political matters which cannot be discussed here. It is furnished with a bibliography, but no index.

M. I. N.

AFRICA

General Smuts' Campaign in East Africa.— Brigadier-General J. H. V. Crowe. Introduction by **General Smuts.** London: John Murray. Pp. xxiii. and 280. *Sketch-maps. Price* 10*s.* 6*d. net.*

Sketches of the East Africa Campaign.— Captain R. V. Dolbey, R.A.M C. London: John Murray. 1918. Pp. xxiv. and 219. *Illustrations and Sketch-map. Price* 6*s. net.*

Brigadier-General Crowe was in command of the Royal Artillery in East Africa during the period of General Smuts' campaign there, and his narrative is almost entirely a record of military events. It may be regarded as a semi-official account, and while it is reticent with respect to certain events on which fuller information would be welcome, it makes some unexpected disclosures —for instance, as to the blockade-running by the Germans in 1915 and 1916. General Crowe brings out clearly the great physical obstacles to campaigning in East Africa, and the wonder grows that the South Africans, unaccustomed to bush fighting, accomplished so much in so short a time. For the protraction of the campaign should not blind us to the fact that, with the help of the Belgians and General Northey, the greater part of German East Africa was conquered in the seven months March-September 1916, and that the driving force in that period was mainly General Smuts and his South Africans—British and Boer. The introduction by General Smuts adds considerably to the value of the book; it is specially noteworthy for his powerful plea that the conquered country "may never be allowed to become a menace to the future peaceful development of the world," as General Smuts rightly holds that it would be were it returned to Germany. Moreover, it would be a great betrayal of the interests of the natives.

Captain Dolbey, a Canadian doctor, does not give us a formal narrative, but his sketches go a long way to help the reader to get the "feel" of East Africa —or rather of those parts of it in which the doctor worked while attached to the army of General Smuts. They are mainly letters written home, and they have the vivid touch which comes from first impressions—when one possesses, as does the author, insight and the gift of letters. Naturally there is a good deal about disease and sickness, of the patients and nurses in the hospitals; there are also arresting descriptions of the country, its inhabitants, its flora and fauna, and of the bestiality (it is the correct word) of the Germans. It is a book well worth reading by all who enjoy the study of nature, animate or

inanimate. Those who know or are specially interested in East Africa will appreciate it most. It discusses in a very sensible manner some serious issues —such as the knowledge gained by the African that as a trained soldier he is, in Africa at least, the equal of the white man. Some slips there are, as when Captain Dolbey writes that German East Africa is "fully developed with excellent railways," etc., a statement which even his own experiences must have disproved; but these slips are not many, and the picture given us is, as a whole, very accurate. The illustrations are good. F. R. C.

GENERAL

The Life and Letters of Sir Joseph Dalton Hooker. **Leonard Huxley,** based on material collected and arranged by **Lady Hooker.** London: John Murray. 1918. *Price 36s. net.*

A man's life lasting nearly a century strenuously and zealously devoted to scientific work of a most detailed character up to its last years, must be almost unique. Such is the record of the subject of this memoir.

The life of Sir Joseph Hooker, distinguished as a botanist and a traveller, appeals to a wide circle. But it is especially to the biological student of the latter half of the nineteenth century that the account of Hooker's work will be attractive. To him, in fact, it is of absorbing interest. Every one interested in or influenced by the theory of Evolution must be attracted by the biography of a life-long friend of Darwin, one whose help and advice the author of the 'Origin of Species' was never tired of acknowledging. The significance of Hooker's work as a pioneer in that all-important branch of Evolutionary study —Geographical Distribution—has hardly been sufficiently appreciated, and the admirable account of it Mr. Huxley has given in this 'Life' must be regarded as one of the features of the book.

Growing up in a botanical atmosphere, stimulated and encouraged by the work and example of his distinguished father, Hooker was probably more favourably placed than any one for embarking on a life of botanical study and investigation. It was this favoured start, supported by his prodigious power of work and application, and the possession, as he modestly admits, of a *talent de bien faire*, that made him the first botanist of his time. Hooker's industry was indeed phenomenal, and the picture of him in his 93rd year "with my eyes as good as ever and my fingers as agile as ever" deftly dissecting small plants, examining them under the microscope and sketching them, must excite the wonder and admiration of every one who has ever engaged in biological work.

Preponderant attention is naturally given to Hooker the botanist, and the geographer will perhaps feel some regret that more space could not have been given to Hooker the traveller. The classical 'Himalayan Journals' which have charmed and instructed every one who has read them, are illuminated by many facts and letters chronicled by the biographer, and they cast a glow over the whole of Hooker's subsequent life, for one of his greatest achievements, occupying him down to his last years, was the 'Flora Indica.' The time, labour, knowledge, and detailed investigation bestowed on this colossal work have probably never been surpassed in the production of any scientific monograph. Yet it was only one of four similar works on which Hooker's fame as a botanist rests. With it must be ranked the 'Flora Antarctica,' the 'Genera Plantarum' in collaboration with Bentham, and the 'Kew Index' which owed its inception to Darwin, and the means for its execution to his munificence. Hooker's early Antarctic experiences, when as assistant surgeon he accompanied Sir John Ross on his celebrated voyage to

the Southern Seas, and his travels in Morocco, are duly recorded, though hardly with the amount of attention from the geographical point of view one would have desired. Hooker's geographical aptitude was strikingly exemplified by his success in mapping the unknown region he explored during his Himalayan travels. His map of Sikkim, planned under the greatest difficulties, was so good that it was of service to military and diplomatic expeditions half a century after it was executed. An interesting incident illustrating this was a telegram sent to Hooker from Khambajong, in Tibet, by the officers of the Tibet Mission in 1903, expressing their appreciation of the assistance it had afforded them. They "desire," the telegram runs, "to send you their felicitations and express their high admiration of that zeal displayed by you fifty-five years ago which has enabled them to follow in your steps, and has inspired them to emulate your devotion to science and to your country."

With Lady Hooker's assistance, Mr. Huxley has managed very skilfully to bring before us the character of Sir Joseph Hooker. His transparent honesty, his kindliness of disposition, his wide human interests and affectionate nature, are made to reveal themselves by the able and artistic manner in which the biographer has utilized the materials at his disposal. These traits, so similar to those of his dearest friend, Charles Darwin, may well account for their long and deep friendship.

The name of Hooker will always be associated with one of the nation's greatest treasures; Kew Gardens. A very interesting account is given of the association of father and son with Kew, and of the growth and vicissitudes of the famous gardens. The tens of thousands of Britons from all parts of the Empire who have found instruction and pleasure there, should know how much they owe to the two distinguished men who for so many years directed and developed them.

Among Hooker's minor works was one which connects him with another branch of science, ethnology. This was the editing of the journal of Sir Joseph Banks, who has been well described as the first great voyager naturalist in a series of which Darwin was the greatest. As a boy Hooker had the opportunity of reading the original manuscript, was fascinated by it, and always hoped it might be published. This he was himself able to do in his 79th year. Banks' Journal had been put at the disposal of Hawkesworth when he was commissioned by the Government to write an account of Cook's first great voyage in the *Endeavour*. Critics have always felt the unsatisfactory character of Hawkesworth's *réchauffé*, and Banks' Journal shows that he did it less than justice. The freshness, directness, clearness, and acumen with which Banks describes native races and customs, especially in the Pacific, make his Journal of the highest value, especially when it is remembered that it was written more than half a century before the generally regarded authoritative accounts of Ellis, Turner, and others. Hooker therefore, in publishing this work, did a service to a branch of science which is only now beginning to receive the appreciation it deserves.

Hooker's friendship and association with Huxley and Lyell form an interesting phase of the biography which enables us to form a truer estimate of the part played by the four apostles of Evolution, working together at one of the most important scientific epochs the world has ever known.

E. A. PARKYN.

Frontiers: A Study in Political Geography.— **C. B. Fawcett, B.Litt., M.Sc.** Oxford: At the Clarendon Press. 1918. Pp. 107. *Five Sketch-maps.* 3*s. net.*

This interesting and suggestive little book, which is based upon an address delivered in 1915 to the Hampshire Branch of the Geographical Association, is described as a discussion of frontiers, rather than of boundaries, as geographical facts. The context shows, however, that the adjective is to be interpreted as referring to physical and political rather than to human geography. Thus a political frontier is defined as an area of separation between two areas of more or less homogeneous, and usually denser, population. It would of course be equally possible to say that it is, or should be, an area of separation between two well-defined human groupings; but the standpoint represented by such a statement is scarcely considered in the book. In other words, the author does not raise the question as to the extent to which the division of human communities into nations organised as States represents a permanent and fundamental characteristic of civilized man. He appears to look upon the separateness of States as an external and imposed phenomenon, rather than as an expression of a biological fact. The implications of this point of view become specially apparent in the final chapter on the evolution of frontiers, notably in the section dealing with the difficult problems presented by those parts of Eastern Europe where peoples of different nationalities are mingled in the same area. In such regions Mr. Fawcett sees only three possibilities for future peace—the handing over to the majority in any particular territory of the minority of "foreigners"; the giving of local autonomy to the "islets" of foreign settlement; or, the production of uniformity by encouraging, or compelling, the minority to migrate beyond the limits of the area occupied by the majority. While recognizing the difficulties involved in all three courses, he inclines to a combination of the first and third as the best solution. But if nationality is in reality a characteristically human response to environment, other possibilities surely present themselves. The occurrence of two, or more, different types of culture within a limited area is either an artificial phenomenon, due to external interference, or it is a stage in social evolution. In the latter case one may hope that the separate elements, if left to themselves, will combine, with the resultant evolution of a new type. This has occurred in the past in Great Britain and in France, and seems to be occurring at present in Italy. If, on the other hand, the heterogeneity of population has been produced and maintained by external interference, as where groups of colonists have been deliberately settled in a particular area by state action, then there is a prospect that with the removal of the external interference the existing alien element will prove incapable of survival and will undergo gradual absorption, without the need of recourse to the terrible device of forcible removal.

It is a tribute to the suggestiveness of Mr. Fawcett's book that the reviewer is tempted in this way to pursue the lines of argument which he starts, instead of seeking merely to summarize its contents. The book may be recommended to all interested in frontier and boundary problems, and it is especially strong on the historical side. The accounts of the parts played by boundaries, natural and artificial, in different parts of the world in the past are both fresh and effectively put, and the examples are chosen from over a very wide area.

M. I. N.

THE MONTHLY RECORD

ASIA

European Names in the Himalaya and Tibet.

WE are informed by the Surveyor-General of India that in his endeavour to purify Himalayan nomenclature and to get rid of unsuitable names from the map of Tibet, he proposes after consideration that the only European name to be retained north of Tibet shall be Kaufmann Peak in the Trans-Alai range, in Russian territory. He proposes to omit the names "Empress Marie Range" and "Nicholas II. Range," and to eliminate the following European names which appear in the maps of Sven Hedin :

Prjevalski : Part of the Kuenlun, locally known as the Arka tagh.

Elisée Reclus and Marco Polo : In Kuenlun ; locally known as the Bokalik (the cattle range, from the number of wild yaks there).

Richthofen : The northern range of the Nan Shan.

Humboldt : The main Nan Shan.

Ritter : The range south of the Nan Shan, and the western continuation of the South Koko Nor range.

Dutreuil de Rhins and Dupleix : Nearly on the 34th parallel between 86° and 90° E. long., in the lake district of Tibet. These do not, as far as we know at present, form part of a definite system for which a name would be desirable, but the country is practically uninhabited, and there are therefore no known place-names.

King Oskar : In the Koko-shili range, 36°/90°.

Hedin Range and Ryder Range : The range extending from south-east of Gartok eastwards along the north of the Brahmaputra Valley.

The Surveyor-General remarks : "Some of the above names belong to explorers who passed only a short time in Tibet. Their names are no more entitled to be recorded permanently on geographical maps than the names of many British surveyors who discovered ranges in the Himalayas and in Southern Tibet between 1800 and 1900. That the names of British explorers have not been permanently recorded is due to the understanding between the Royal Geographical Society and the Survey of India that such names are not suitable for the geography of Asia." We note that on the Survey of India map of "Tibet and Adjacent Countries," 1/2·5M, the following European names not mentioned in the Surveyor-General's communication are found : Suess Range, Alexander III. Range, Armand David Lake, Markham Lake ; and on Sheet 2 of the map of "India and Adjacent Countries," 1/2 M, is Bonvalot Mountain. In Andree's Atlas there are in addition the following personal names : Mount Ferrier, Kolumbus Kette, Ruysbruk Volcano, Muschketow Gebirge, Semenow Gebirge, Montcalm See, Deasy Gebirge.* We may anticipate that these names will also be banned by the Surveyor of India, whose decision will be accepted by British geographers as authoritative, though the names occur in territory which is officially Chinese. It is unlikely that a Chinese surveyor-general would adopt such names planted in his jurisdiction by foreign travellers ; and were he to do so the necessity of turning them into Chinese would effectually

* Stieler's Atlas has also a number of descriptive names, not personal, such as Rotfelsen See, Zwillings See, and Rebhühner See, Jaeger Pass, Kegel See, etc., some of which exhibit the paucity of imagination that Sir Sidney Burrard deplored in his recent note.

conceal their signification. It seems clear, therefore, that British geographers should accept the Survey of India as the authority for the retention or rejection of exotic names in Chinese territory adjacent to the borders of India, at least until we have an official Romanization of Chinese mountain and lake names which we can adopt, as we are prepared to adopt the names of Chinese cities from the Chinese Postal Guide.

Revegetation of Volcano Island, Luzon.

Much attention has been given of late years to the processes by which ground from which the cover of vegetation has been destroyed by volcanic action becomes in course of time once more clothed by plant-growth. Such studies, among others, have been made for Krakatao in the Malay Archipelago and for Katmai in Alaska, and to these may now be added that for Volcano Island in Luzon (Philippine Islands), nearly all the plant-life on which was destroyed by the great eruption of the Taal volcano in 1911. The results of the study in this case are recorded in the *Philippine Journal of Science* for July 1917 (vol. **12**, Sect. C, No. 4), by Messrs. Brown, Merrill, and Yates, who describe the course of revegetation down to January 1917 as observed by themselves and others. Volcano Island rises from the floor of Bombon Lake in Luzon, and the crater of the volcano which occupies a considerable part of it is in turn filled by a lake. From the available records of the vegetation as it existed before the eruption, it seems that it was mainly of the form known in the archipelago as *parang*, *i.e.* a mixture of grass and small second-growth trees, generally to be found in Luzon where the original forests have been removed by the agency of man. Erosion was very active and in some parts vegetation was always very scanty, though in others the growth may have been dense enough to be described as second-growth forest. During the eruption there was no flow of lava, and the destruction was not caused by fire, but was largely due to the explosive action of the escaping steam which was suffocating from its heat, its burden of mud, and a content of sulphur dioxide. This blast broke the trees and ground the bark to shreds. The fall of ash was not particularly heavy, but the mud seems to have been very injurious to vegetation. Only in the northern part of the island was the destruction less complete. The progress of revegetation has been very different from that usually observed in lands cleared for cultivation and afterwards allowed to lapse into a wild condition. The chief invading species have been grasses, and the ground was only sparsely covered even with these after nearly six years. No second-growth forest had sprung up and trees were still very scarce except in limited areas, though relatively varied as regards species. The most abundant species were *Acacia farnesiana* and a small variety of *Ficus indica*. Some of the latter may have sprouted from old stumps, but the method by which the former has been distributed all over the island is not evident, as its fruit is apparently not eaten by birds, nor is it adapted for wind-distribution. Other prominent trees are such as are generally characteristic of *parang*, and have seeds which are distributed by birds. The early stages of revegetation have been very different from those on Krakatao, where the development of a strand vegetation was conspicuous, and also the preponderance of ferns: grasses, though eventually predominating here too, were much slower in establishing themselves. An explanation is to be found in the fact that Krakatao is surrounded by *salt* water, and at a much greater distance from other land. The slowness of revegetation on Volcano Island is probably due to environmental conditions connected with the soil. Most of the steep slopes are composed of soft loose material which is readily

eroded, and the chemical composition seems also to be unfavourable. The paper is well illustrated by sketch-maps (one showing how the new vegetation has spread mainly from the north, where the island approaches the mainland most nearly) and plates, and gives full lists of plants observed since the eruption, with statement of their relative abundance, method of distribution, and geographic origin. The comparison with Krakatao brings out the much greater efficiency of dispersal by birds over short than over long distances.

AFRICA

The Rahad River, a Tributary of the Blue Nile.

The Rahad, which enters the Blue Nile from the east just below Wad Medani, drains an area in the Eastern Sudan which offers considerable possibilities of agricultural and commercial development, but which is still undeveloped by reason of the difficulty of access. Like other rivers of this region not fed by perennial reservoirs, its bed is filled only during the rainy season, for in the dry season it degenerates into a series of pools, sometimes miles apart. Its course is narrow and tortuous, so that in spite of the fairly abundant water-supply in the rains its navigation is a matter of difficulty. But the country drained by it is so fertile and rich in possibilities that serious attempts have lately been made to open up water transport, as described by Mr. C. H. Page in the new serial *Sudan Notes and Records* (vol. 1, No. 27). In August 1914 Mr. Armbruster in the *Amara* ascended the river 420 miles from its confluence with the Blue Nile, but the voyage proved difficult and dangerous from the combination of rapid current, innumerable sharp bends, hidden rocks, and the presence of trees not only overhanging the water but growing in the river-bed. In 1915 the late Lieut. Huntly Walsh, R.N., made a new attempt with a tug and two barges, starting in July, and experienced similar difficulties, delay being also caused at the outset by the shallowness of the water. At Mefaza (about 13° 37′ N.), reached sixteen days from the start, cargo was taken on board the barges and the still more difficult return was begun, during which much damage above water was caused to the barges. In 1916 Mefaza was once more reached with a tug and six barges, the latter again suffering severely. Early in 1917 a working party was sent up to clear the trees which obstructed navigation and some of the worst rocks, and a great improvement was thus effected, though work was hampered by the scarcity of water, which could not be obtained in sufficient quantity for the workmen and transport animals, even from wells sunk in the river-bed. With the flood of 1917 Mr. Page ascended the river in a stern-wheel steamer, reaching Mefaza in eleven days from the final start, and continuing on to Khor Simsim, finding the Rahad here a fine river and easier to navigate than in its lower course. The whole valley seemed to be one vast level plain, the banks densely wooded throughout, chiefly with the spiny sunt (*Acacia nilotica*), a useful timber tree, which increased in size and density from the mouth upwards to Abu Sheaba. Higher up castor-oil plant and cotton grew at the water's edge for miles. Population is now very scanty, partly on account of the absence of water in the dry season, partly because the country was denuded of its inhabitants by the Dervishes. Apart from reptiles, monkeys, and a few birds, animal life was almost absent. On the higher reaches, however, crocodiles were very numerous and vicious. The great need is population to make the most of the agricultural possibilities, and cheap transport for the produce. The latter might be supplied partly by the evolution of a special form of river craft, partly by the further removal of obstructions, or, if possible, the construction of dams and locks.

Floods at Derna, Tripoli.

The conditions attending two notable floods at Derna are discussed by Prof. Eredia in an illustrated official paper entitled "Le piene dell' uadi di Derna" (*Boll. d'Informazioni*, Anno V., 1918). The rainfall of Cyrenaica is not abundant, averaging about 8 inches per annum at Derna, and 11 inches at Bengazi, and, as is commonly the case in low latitudes, very variable from year to year. At the former port the wady which drains the surrounding hills is liable every two or three years to floods which considerably affect the normal life of the district. Since the Italian occupation of Tripoli systematic records have been kept of such occurrences, and the two instances discussed by Eredia are those of 30 November 1913 and 12 April 1916. On the winter occasion the rainfall which provoked the flood amounted to 3·1 inches in seventeen hours, an exceptionally heavy fall in one day for the district, and an exceptionally long duration of continuous rain. The spring flood, on the other hand, was the sequel to a violent thunderstorm which burst over the neighbouring plateau, bringing 1·2 inches of rain in about two hours. Owing to the greater intensity of precipitation, however, the second inundation was the more destructive, and considerable damage was done to bridge-work in course of construction over the watercourse. The barometric conditions accompanying these heavy rains are discussed in some detail, and in general it appears that heavy precipitation in Cyrenaica is due to depressions which form locally or move thither from neighbouring regions. It is noted that in Tripoli and Cyrenaica the intensity (rate of fall) of torrential rains is much less than in Southern Italy. This is an interesting climatic peculiarity, quite in keeping with the more generally dry conditions due to Saharan influences. In peninsular Italy, given a general meteorological *régime* favourable to rainfall such as occurs in winter, the warm Mediterranean Sea favours heavy and intense precipitation; and it is just because of the propinquity of this warm reservoir that the Abruzzi and high southern Appennines in general, though not high enough for perennial accumulations in that latitude, receive such an enormous winter snowfall—possibly greater than in any mountain system of Europe.

African Lake Levels.

In response to a request for information as to the present condition of the Lukuga outlet from Tanganyika, Lieut. Longland sends us the following notes from Sikonge, dated 30 June 1918: The Lualaba between Kindu and Kabalo appears to have cut its channel comparatively recently. The surrounding country is extremely flat and liable to flood. There is no delta at the confluence of the Lukuga, which enters the Lualaba at right angles. When passing on a shallow-draught steamer I did not notice that the current was extra strong. The railway from Kabalo to Albertville follows the valley of the Lukuga from about kilom. 219. As viewed from the train the river appears to be very swift and much broken by rocks. I have never seen or heard of any navigation on the river, except by canoes in places. I believe there was a good deal of blasting at the outlet end of the river, *i.e.* on the lake, at the beginning of the war; this to form a harbour for vessels. In 1917 Kabalo and surrounding country were flooded. I left Kigoma in February 1917 and went down to Kinshasa, Stanley Pool. On my return to Kigoma in July 1917 I noticed that the water had been over part of the harbour works there.

AMERICA

The Mineral Resources of Canada.

We are indebted to Dr. W. G. Miller for the following note, based on his contribution to the discussion after Mr. Meighen's paper, the proof of which did not reach him in time for correction for the August *Journal*: The Hudson Bay Railway is being built primarily to carry grain, but the region on the western side of the bay is a most promising mineral field; it contains the same rocks as those that occur in areas already developed with such great success in the Province of Ontario and in the States of Michigan and Minnesota, and Canada has an immense territory to develop there, as also another practically unexplored on the eastern side of the bay: in fact, surrounding Hudson Bay is one of the largest and most promising mineral regions in the world. The mineral possibilities of the region, to say nothing of the fisheries and other resources, justify the building of the railway, even if it should never carry grain. While mineral production in Canada is not nearly so great as in the United States, Canada already leads in several important products. She has absolute control of the important nickel industry, of asbestos, cobalt, and other minerals.

Sixteenth-Century Maps of South America.

During the first half of the sixteenth century the centre of South America remained almost a blank on the map, but after Orellana's voyage down the Amazon in 1542 the winding course of that river, from source to mouth, was generally inserted, with a fair sprinkling of place-names. Some are obviously derived from the account of Orellana's voyage, but all cannot be so explained. Some may have reference to journeys into the unknown forests east of the Andes by adventurers like Pedro de Candia, or Juan Maldonado, but the chronicles do not appear to mention them. One series, south of the Upper Amazon, includes the following: Vratambare, Carcaraes, Itapoan, Chane, and Mayaco. On the Amazon itself a place Mapazo (or Maparo) regularly appears, and may possibly be a corruption of the Machiparo of Orellana, even though this is also shown, in one map at least. Another recurrent feature, from the map of Bartholomeu Velho (1561) onwards, is a Lake Eupana, discharging in three different directions. The origin of this name is obscure, though as Velho's map displays some authentic knowledge of the interior of Eastern Brazil, it seems possibly due to some Portuguese explorer such as Aires da Cunha, whose name appears on the map. Suggestions as to the sources of the above names would be welcomed.

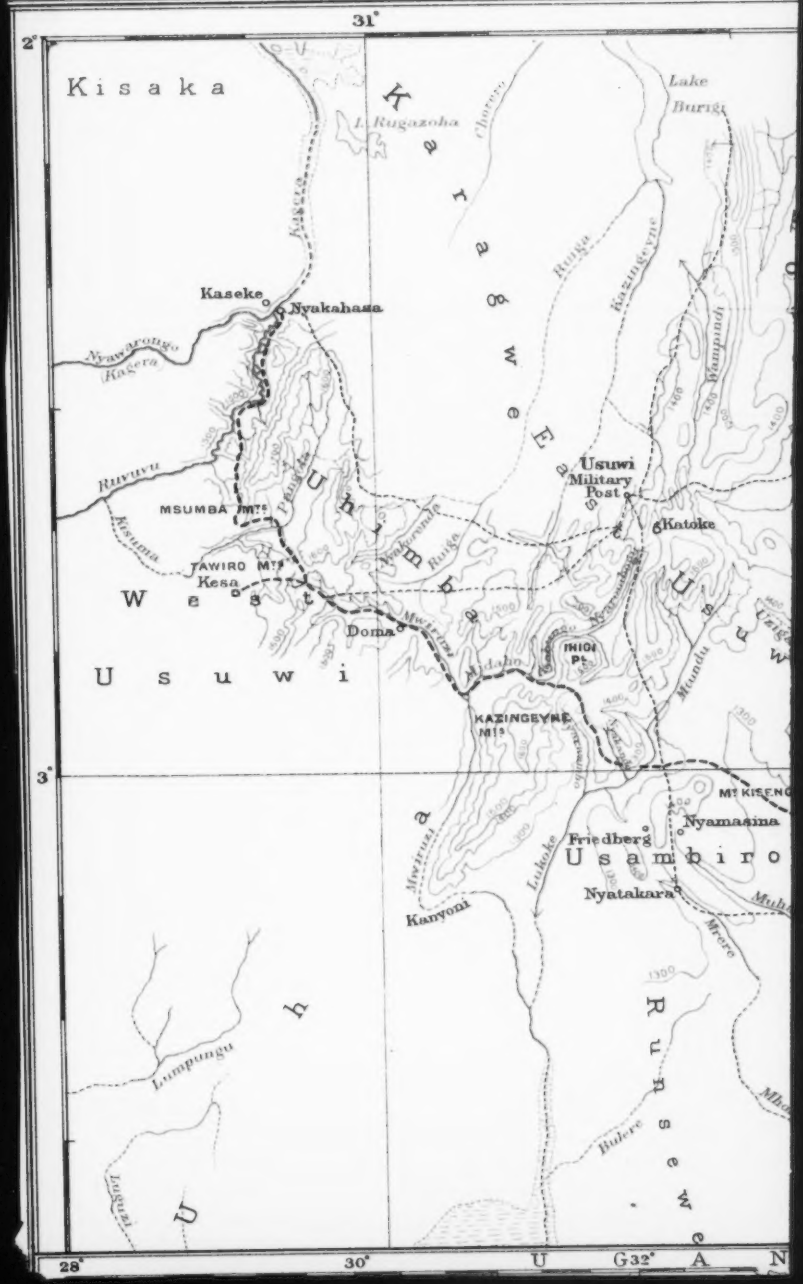
CORRESPONDENCE

The Name of Baku.

On page 266 of the R.G.S. *Journal* for this month it is stated that, as explained by Egli on the authority of Lepsius, the name of Baku is derived from the Persian Baadku (Badku), "mountain wind." This must have been written in ignorance of the name of the place as it is known in Persia, *i.e.* Bādkúbeh (بادکوبه), meaning *wind stricken.*

Yours very truly,
ALEXANDER FINN.

Park Road, Richmond, Surrey,
10 October 1918.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Wampindi
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KAZINGEYNE
Mts
Mt KISENG
Nyamasima
Friedberg
Usambiro
Nyatakara
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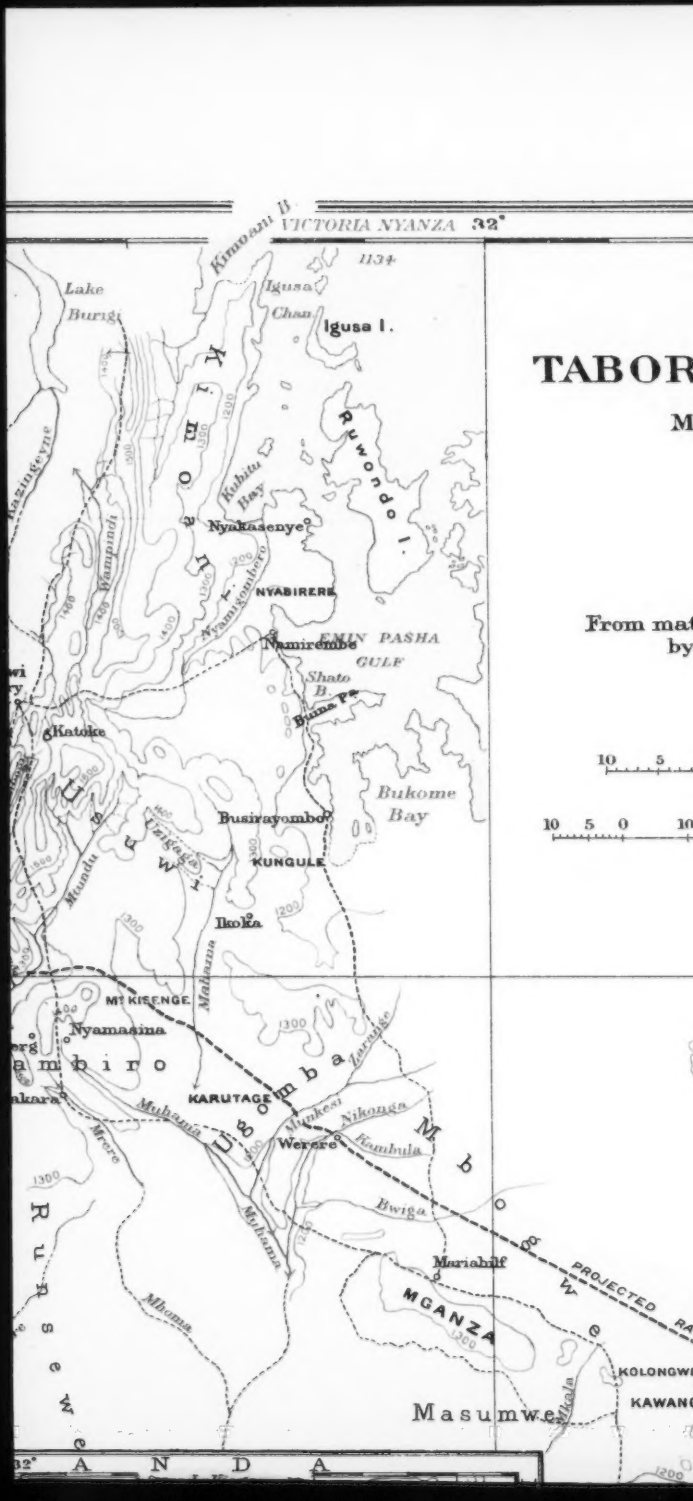

VICTORIA NYANZA 32°
Kimwani B.
Lake Burigi
Igusa Chan
Igusa I.
1134
Kyamutwara
Kubitu Bay
Ruwondo I.
Nyakasenye
NYABIRERE
Nyamigombero
Namirembe
EMIN PASHA GULF
Shato B.
Buma Pe
Katoke
Bukome Bay
Busirayombo
KUNGULE
Ikoka
Mundu
Mt KISENGE
Nyamasina
Mbiro
KARUTAGE
Mubanda
Mwikesi
Nikonga
Kombula
Were
Bwiga
Mariahilf
MGANZA
PROJECTED RA
KOLONGWE
KAWANG
Masumwe
Rusewe
Mbosswe
Mbaga
Zaranga
Madaraza
Mbarara
Mbama
Mbama
Mhoma
Mkola
1300
1200
TABOR
From mat
by
10 5
10 5 0 10
32°
A N D A

33°

2°

SURVEY FOR RAILWAY

from

BORA TO THE BEND OF THE KAGERA

Made by order of Dr H. Schnee
Governor of G.E.A.

1913.

To illustrate the paper by
C. P. MAC CARTHY.

om material captured at Tabora and communicated
by the Belgian Ministère des Colonies.

Scale 1/1,000,000 or 1/ M.

5 0 10 20 30 40 50

Miles.

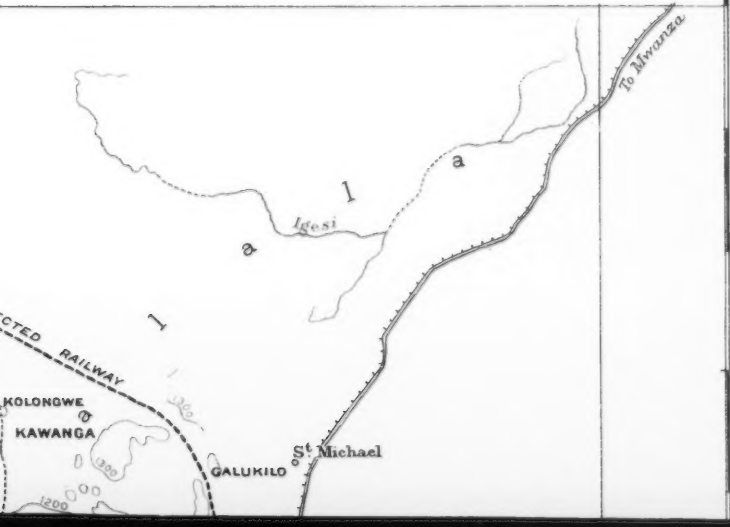
0 10 20 30 40 50 60 70 80 90 100

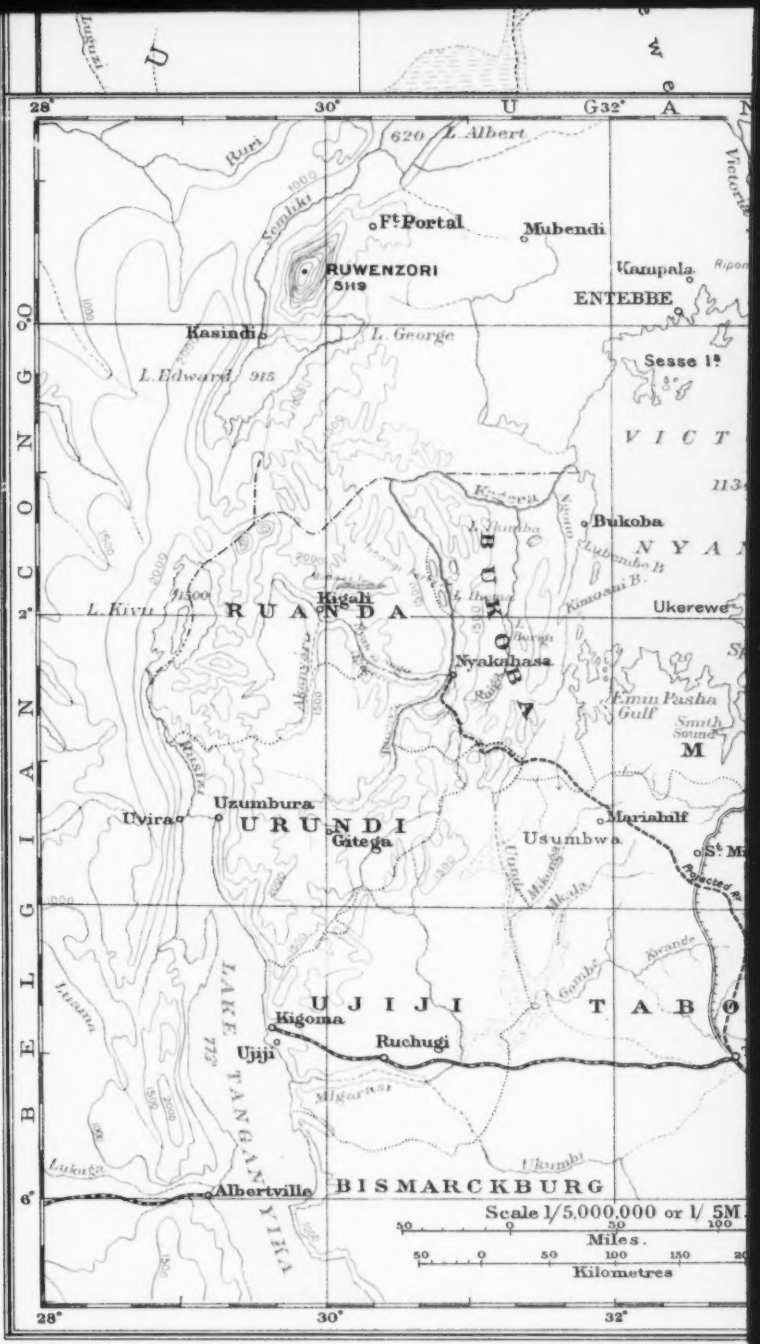
Kilometres.

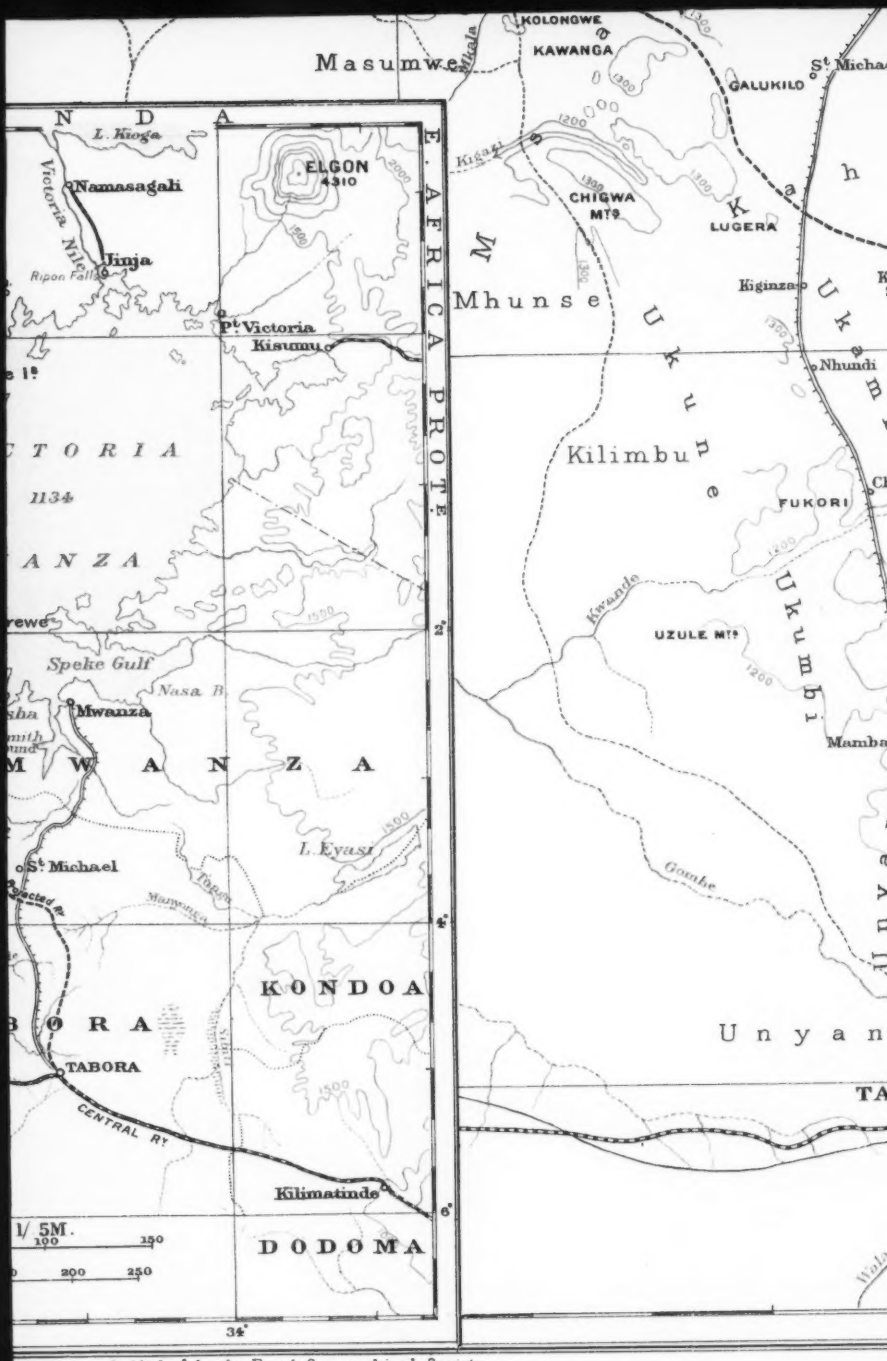
Road and Telegraph .....
Tracks .....

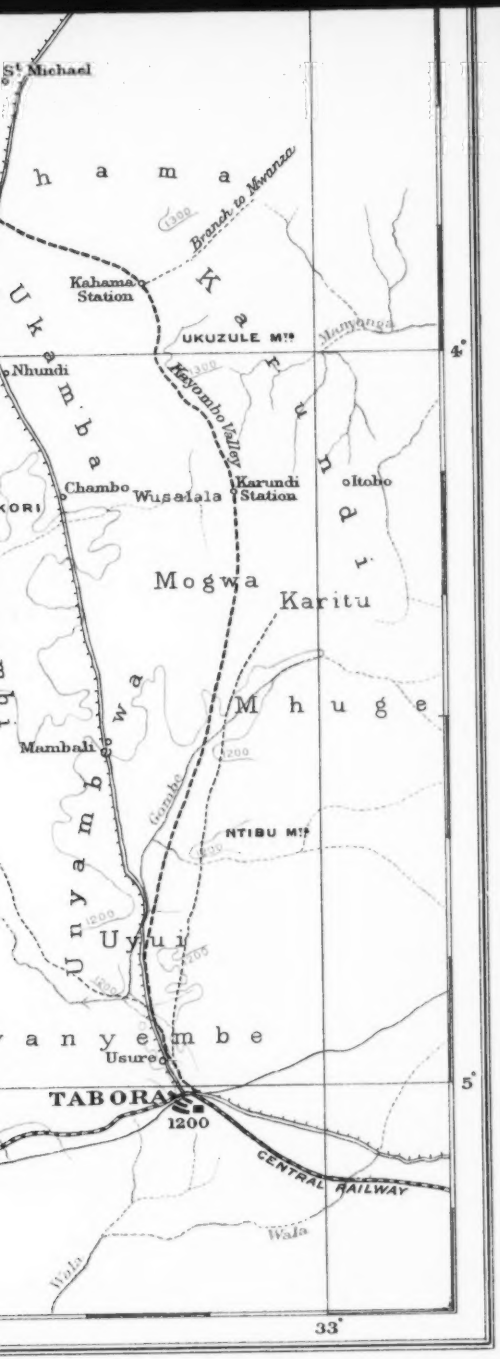
Heights in Metres.

3°




28°
30°
32°
Ruri
620
L. Albert
Semliki
Ft. Portal
Mubendi
RUWENZORI
5119
Kampala
ENTEBBE
Kasindi
L. George
L. Edward 915
Sesse Is.
VICT
Kigezi
Bukoba
NYA
Kigali
L. Kivu
RUANDA
BUKOBA
Ukerewe
Nyakahasa
Emin Pasha Gulf
Smith Sound
M
Uzumbura
Uvira
URUNDI
Gitega
Usumbwa
Mariahilf
Kigoma
Ujiji
Ruchugi
UJIJI
TABO
LAKE TANGANYIKA
Albertville
BISMARCKBURG
Scale 1/5,000,000 or 1/ 5M
Miles.
Kilometres
BELGIAN CONGO


Masumwe
KOLONGWE
KAWANGA
GALUKILO
St Micha
N D A
L. Kioga
Victoria Nile
Namasagali
Jinja
Ripon Falls
ELGON
4310
E. AFRICA PROT.
Kisaki
CHIGWA
Mt?
LUGERA
Mhunse
Kiginza
Pt Victoria
Kisumu
Nhundi
Kilimbu
FUKORI
Kirando
UZULE Mt?
Mamba
Speke Gulf
Nasa B.
Mwanza
M W A N Z A
St Michael
L. Eyasi
Gombe
KONDOA
TABORA
CENTRAL RY.
Kilimatinde
DODOMA
1/ 5M.
100 150
200 250
Unyan
TA
Published by the Royal Geographical Society



RAILWAY DEVELOPEMENT IN E. AFRICA
Mac Carthy.